LUSHER STREET GROUNDWATER CONTAMINATION SUPERFUND SITE

Operable Unit 1

ELKHART, ELKHART COUNTY, INDIANA

Record of Decision For Interim Action

U.S. Environmental Protection Agency Region 5

77 West Jackson Boulevard
Chicago, IL 60604

September 2014

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LIST OF ACRONYMS AND ABBREVIATIONS

ARAR	Applicable or Relevant and Appropriate Requirements
CIC	Community Involvement Coordinator
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CFR	Code of Federal Regulations
COC	Contaminant of Concern
COPC	Contaminant of Potential Concern
COI	Contaminant of Interest
CSM	Conceptual Site Model
EPA	United States Environmental Protection Agency
EPIC	Environmental Photographic Interpretation Center
ESD	Explanation of Significant Differences
FS	Feasibility Study
FFS	Focused Feasibility Study
HI	Hazard Index
HRS	Hazard Ranking Score
HSCD	Hazardous Site Cleanup Division
OSWER	Office of Solid Waste and Emergency Response (EPA)
NCP	National Contingency Plan
NPL	National Priorities List
O&M	Operations and Maintenance
OU	Operable Unit
PCE	Tetrachloroethylene
PRAP	Proposed Remedial Action Plan
RAC	Remedial Action Contract
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RME	Reasonable Maximum Exposure
ROD	Record of Decision
RPM	Remedial Project Manager
TCE	Trichloroethylene
VOC	Volatile Organic Compound

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EPA SUPERFUND PROGRAM
OU-1 RECORD OF DECISION FOR INTERIM ACTION
LUSHER STREET GROUNDWATER CONTAMINATION SUPERFUND SITE
ELKHART, ELKHART COUNTY, INDIANA

1.0 Declaration

1.1 Site Name and Location

The Lusher Street Groundwater Contamination Superfund Site, Operable Unit 1 is located in Elkhart, Elkhart County, Indiana. The Site's Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) ID number is IND982073785.

1.2 Statement of Basis and Purpose

This Record of Decision (ROD) presents the interim remedial actions (the "Selected Remedy") selected by the U.S. Environmental Protection Agency (EPA) for the Operable Unit 1 (OU-1) of the Lusher Street Groundwater Contamination Superfund Site (Site). EPA selected the Interim Remedy in accordance with Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, by the Superfund Amendments and Reauthorization Act of 1986, and, to the extent practicable, the National Contingency Plan (NCP). This decision is based on the Administrative Record File for this Site.

While EPA continues to study long-term groundwater clean-up options at the Site, this ROD documents the selection of an interim remedial action to eliminate actual and potential human health exposures from drinking, inhalation and direct contact related to contaminated groundwater; and from inhaling indoor vapors emanating from contaminated groundwater underlying a residential area at the Site. The Site is located in Elkhart, Elkhart County, Indiana (see Figure 1, Site location map).

1.3 Assessment of the Site

The response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

1.4 Description of the Selected Interim Remedy

This interim Remedial Action includes a) the connection of a safe and permanent municipal drinking water supply to properties potentially at risk from contaminated groundwater; and b) installation of a vapor intrusion mitigation system at buildings where vapor intrusion from contaminated groundwater poses an unacceptable risk to human health.

The site is divided into two operable units or OUs. The first operable unit is the contaminated groundwater. The second operable unit is the source materials (e.g., contaminated soils) for the contaminated groundwater. The selected interim action for OU-1 consists of the following:

1. Water Main Connection. Extension of the City of Elkhart Municipal Water Supply to approximately 72 properties located within the contaminated groundwater plumes (main plume and spot plume), with an approximate 500-foot buffer around the plumes, or potentially down gradient of the plumes. This includes the Site area bounded by Hively Avenue to the south, the St. Joseph River to the north, Oakland Avenue to the East, and Nappanee Street (State Route 19) to the west. Two areas of the Site, northeast and southeast (as identified in Figure 3) are excluded from this Interim Remedial Action. Contamination is not currently in these areas, nor expected to migrate to these areas. These areas are outside of the 500-foot buffer and are either up-gradient or cross-gradient from the contaminated plumes. The estimated number of properties with buildings requiring connection to municipal water is based on (1) geographic information system data obtained from Elkhart County and (2) a list of addresses with water accounts obtained from the City of Elkhart Public Works Department. The actual number may vary as buildings are condemned, demolished, abandoned, or constructed in the relevant areas; and will be verified during the remedial design and construction phases.

2. Vapor Intrusion (VI) Mitigation. VI mitigation will be implemented at approximately 200 buildings which overlie the Site-related groundwater contamination plume, and where EPA determined, through multiple lines of evidence, that the actual or potential migration of Site-related contaminants from contaminated groundwater to indoor air results in an unacceptable risk. VI mitigation will be necessary at these buildings until the groundwater contamination plume is remediated such that vapor intrusion no longer poses an unacceptable risk to human health. Remediation of source areas contributing to groundwater contamination at the Site is being addressed as OU-2. EPA will select a final cleanup plan to address the contaminated groundwater in a final ROD for OU-1.

   Dependent upon the construction type and layout of individual buildings, EPA may use a variety of vapor intrusion mitigation techniques, including sub-slab depressurization (radon-type system) and crawl space depressurization to prevent Site-related vaporized contaminants from migrating from the subsurface into indoor air at concentrations that pose an unacceptable risk to human health. The specific building mitigation systems will be determined during the Remedial Design. The estimated cost of the remedy includes the costs to install and maintain the vapor intrusion mitigation systems. EPA expects building owners to pay for the electricity necessary to operate the vapor intrusion mitigation system, estimated at between $5 and $15 per month per building. The operating costs for both types of systems are comparable.

3. Operation and Maintenance (O&M). O&M of the vapor intrusion mitigation systems will continue until the vapor intrusion risk presented by Site-related contamination is acceptable. EPA will consult with the Indiana Department of Environmental Management (IDEM), the support agency for this Interim Remedial Action, regarding this determination.

4. Institutional Controls (ICs). EPA expects that in the future additional occupied buildings may be constructed within the Interim Remedial Area. ICs, such as deed restrictions and/or a local ordinance, are required to prevent potable use of untreated groundwater. Newly constructed buildings will be required to connect to municipal water (if available) or have filtration systems installed and maintained. The ICs will require that construction and utility workers be notified of known and potentially contaminated groundwater so that they take appropriate safety precautions. ICs will also require that any new residential and commercial construction within the Interim VI Remedial Area include a VI mitigation system(s) until EPA determines that it is no longer required.

The estimated cost to implement the selected interim actions is $2.8 M. This cost estimate includes municipal water main connections to approximately 72 buildings and installation of vapor intrusion mitigation systems at approximately 200 buildings.

1.5 Statutory Determinations

This selected interim action is protective of human health and the environment and is intended to provide adequate protection until a final site remedy is successfully implemented and reaches remedial action objectives, complies with Federal and State requirements that are applicable or relevant and appropriate to this limited-scope action, and is cost-effective. This interim action utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. This interim action does not satisfy the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element.

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on-Site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of remedial action to ensure that the selected interim remedy continues to be protective of human health and the environment. Review of this interim remedy will be ongoing as EPA continues select and implement final remedies for the site groundwater and source areas.

1.6 ROD Data Certification Checklist

The following information is included in the Decision Summary section of this ROD. Additional information can be found in the Administrative Record for the Site.

- Contaminants of concern (COCs) and their respective concentrations (Tables 1&2)
- Baseline risk represented by the COCs (Section 2.7)

- Cleanup levels established for COCs and the basis for these levels (Section 2.12)
- How source materials constituting principal threats are addressed (2.11)
- Current and reasonable anticipated future land use assumptions and current and potential future beneficial uses of groundwater used in the baseline risk assessment and ROD (Section 2.6)
- Potential land and groundwater use that will be available at the Site as a result of the selected interim action (Section 2.6 and Section 2.12)
- Estimated capital, annual operation and maintenance (O&M), and total present worth costs, discount rate, and the number of years over which the interim remedy cost estimates are projected (Section 2.13)
- Key factor(s) that led to selecting the interim remedy (Section 2.10)

1.7 Support Agency Acceptance

The State of Indiana Department of Environmental Management (IDEM), as the support agency for the Lusher Street Groundwater Contamination Site, concurs with this interim ROD. The State's concurrence letter has been added to the Administrative Record (Appendix B).

1.8 Authorizing Signature

Richard C. Karl, Director
Superfund Division
EPA Region 5

9-16-14
Date

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2.0 Decision Summary

2.1 Site Name, Location, and Brief Description

The Lusher Street Groundwater Contamination Superfund Site is located in Elkhart, Elkhart County, Indiana and occupies about 870 acres. The boundaries for the Lusher Site are the St. Joseph River on the north; State Road 19 (Nappanee Street) on the west; Hively Avenue to the south and Oakland Avenue to the east (see Figure 1). The estimated population living within the Site boundaries is approximately 2,600. The Site is composed of mixed residential, commercial, and industrial areas bisected by a railroad yard and served by a mix of private wells and public water supply wells. Industrial and commercial activities in Elkhart include the manufacture of pharmaceuticals, recreational vehicles, mobile and modular homes, band instruments (such as woodwinds), tape, corrugated containers, and foam and plastic products. Other industrial activities in the Site area include metal fabrication and scrapping, automobile salvage and repair, plating, lumber yard activities, and a former dump. Many of these businesses are located along Lusher Avenue.

The Lusher Site was first identified as a result of investigations conducted at the K.G. Gemeinhardt Company, Incorporated (Gemeinhardt) manufacturing facility located to the southwest of the Lusher Site at 57882 State Route 19. Groundwater contamination was discovered that did not appear to be associated with Gemeinhardt operations. EPA initially assumed that most of the contamination was from businesses on Lusher Avenue, and so named the new site the Lusher Street Groundwater Contamination Site (misidentifying the name of the road). It was assigned CERCLIS ID number IND982073785.

The Lusher Site generally encompasses the area of a groundwater plume contaminated with volatile organic compounds (VOCs). The source or sources contributing to the groundwater plume have not been fully identified. In 2009, EPA conducted a preliminary investigation for the Lusher Site and identified nine potential source areas, which are discussed in detail in the final RI report. EPA is continuing to actively evaluate these and other potential sources.

The Lusher Site groundwater plume primarily contains chlorinated VOCs, including tetrachloroethene (PCE); trichloroethene (TCE); chloroform; 1,1-dichloroethane (DCA); and vinyl chloride. Historically, 1,1,1-trichloroethane (1,1,1-TCA); 1,1-dichloroethene (DCE); and 1,2-DCE have also been detected in groundwater at this Site. Chlorinated VOCs were commonly used as industrial solvents.

Currently, properties at the Lusher Site obtain drinking water supply from both public and private groundwater wells. Although the depths of the private wells are unknown, they are suspected to be shallow and are located in the sand and gravel St. Joseph Aquifer beneath the Site. The RI identified 94 private wells within the boundaries of the Lusher Site.

EPA is the lead agency for the Site and IDEM is the support agency. Although EPA is prepared to perform this interim remedial action from the Superfund trust fund if necessary, it intends to pursue responsible parties to fund or implement the interim remedy for OU-1.

A description of the extent of the groundwater contamination plume is included below. Depictions of the groundwater contamination plumes are included as Figure 3.

2.2 Site History and Enforcement Activities

In 1985, under the terms of a Consent Decree, Gemeinhardt agreed to conduct an investigation to fully characterize the sources and the extent of groundwater identified to the north-northeast of the Gemeinhardt facility. This Gemeinhardt investigation detected VOCs in private drinking water wells in the areas south of Lusher Avenue that did not appear to be connected to the Gemeinhardt plume. In 1987, Elkhart County Health Department (ECHD) began an extensive investigation of sampling 145 private wells and identified 103 wells with elevated levels of TCE and TCA. In October 1987, EPA's Superfund Removal Program initiated a groundwater investigation at the Site. This investigation confirmed the presence of TCE and TCA at concentrations exceeding the EPA Maximum Contaminant Levels (MCLs) for drinking water. Of greatest concern were TCE concentrations of 1,590 micrograms per liter (µg/L) at a location on West Indiana Avenue and 804 ug/L at a location on 17th Street. As a result of this investigation, in 1987 EPA conducted a removal action at the Lusher Site to mitigate immediate threats to human health and the environment posed by the groundwater contamination of both residential and business water wells. The 1987 removal action resulted in connection of 11 homes to a municipal water system and installation of filtration systems in 24 homes.

In 1988, EPA conducted additional residential and commercial/industrial well sampling. Based on the results obtained in August 1988, additional residences were connected to city water or provided with point-of-use filters. In Summer 1989, IDEM began its own investigation to evaluate if other residents should be provided alternate water supplies at the state's expense. Municipal water lines were extended by IDEM to additional homes and businesses except for one residence located on Avalon Street because no municipal water main was located nearby.

EPA recovered some of its costs for the 1987 response action via a September 24, 1993 cost recovery Consent Decree settlement with Walerko Tool & Engineering Corporation (Walerko). Walerko began operating in 1952 and conducting machining and tool-and-die work at its manufacturing plant at 1935 West Lusher Avenue in Elkhart, Indiana. Walerko used TCA as a parts cleaner in its manufacturing process. Walerko released TCE during its manufacturing operations, which contributed to the groundwater contamination plume. In 1987, the drinking water well at the Walerko property was sampled and contained TCA at 660 µg/L and TCE at 38 µg/L. Walerko's settlement payment was based on its limited financial ability to pay EPA's costs.

In 2005-06, IDEM sampled residential wells in the Site area. Sample results revealed TCE levels at many private wells in the Site area exceeding the MCLs, with one sample at a concentration of 700 µg/L TCE. Based on the analytical results IDEM's State Cleanup Program provided bottled water to residences with sampling results above MCLs. At the same time, IDEM alerted the EPA regarding TCE contamination. In August 2006, the EPA sampled water at one business and four residential locations to confirm IDEM's results. EPA then provided some residents with point-of-use carbon filters.

In 2006, the IDEM began further inspection activities at the Lusher Site. Results for water samples from 10 wells exceeded the MCL for one or more VOCs. Detected TCE concentrations ranged from 7.4 to 640 µg/L. In January 2008, EPA proposed the Site for listing on the National Priorities List (NPL) and finalized the Site on the NPL in March 2008.

In May and October 2009, as part of a Remedial Investigation (RI), EPA conducted a Preliminary Source Area (PSA) investigation at various potential source facilities within the boundaries of the Site. Chlorinated solvents were detected in soil or groundwater at 10 of the 14 properties investigated.

EPA performed additional field work between 2010 through 2012. These activities evaluated the extent of the groundwater plume and the potential for vapor intrusion.

The RI concluded that only four VOCs; TCE and PCE, 1,1-DCA and chloroform had a complete vapor intrusion pathway. There are some uncertainties about the exact number of properties subject to vapor intrusion. The VI pathway was confirmed to be complete in 72-75 percent of the residences from which paired sub-slab and indoor air samples were collected. For the residences where the VI pathway is complete, none of the concentrations exceeded Region 5 removal action levels which would require immediate action. However exposures may still present unacceptable long-term risks.

The distribution of VOCs suggests several sources of contamination, which are likely located in or near the southern two-thirds of the plume area. The Gemeinhardt plume is located southwest to the Lusher Site Plume and does not appear to be connected, as shown in Figure 3. Because of the high permeability of the sand and gravel aquifer, groundwater contamination is expected to move rapidly. The area where VOC concentrations in groundwater exceed MCLs and where VI represents a potential threat, is primarily located in the central and north-central portions of the Site (Figure 3).

Due to the complexity of the groundwater contamination and the potential of identifying additional source areas for the groundwater contamination, EPA decided to pursue a phased Remedial Investigation/Feasibility Study (RI/FS) to understand the nature and extent of groundwater contamination (OU-1) at the Site. This Interim ROD was prepared after the completion of the Focused OU-1 FS in November 2013.

As discussed below, contaminated groundwater and VI is considered to pose an unacceptable risk to human health.

2.3 Community Participation

In 2009, EPA developed a Community Involvement Plan (CIP) for the Lusher Site. The CIP is a required document that EPA uses to address community concerns and expectations. It discusses background and history of the Site, community profile and key concerns, past community involvement efforts, and how EPA will respond to community concerns. The CIP also contains a list of current federal, State, and local officials; information repositories; interested groups; and media contacts.

EPA has actively informed the public of its activities at the Lusher Site. EPA, working with Agency for Toxic Substances and Disease Registry (ATSDR), held open houses in the Site area. EPA shared information about the remedial investigation, planned soil and groundwater testing, and sampling results once available. ATSDR talked to residents about health concerns. EPA shared fact sheets with area residents and businesses and maintains current information on the web site at www.epa.gov/region5/cleanup/lusher. To keep current with documents in the Administrative Record, an updated CD is sent to the information repository at the Elkhart Public Library when new documents are added to the Administrative Record.

The Administrative Record is maintained at two public repositories: the EPA Region 5 Docket Room, 77 West Jackson Boulevard (7th Floor) Chicago, Illinois; and the Elkhart Public Library, Reference Services, 300 S. Second Street, Elkhart, Indiana. The Proposed Plan set forth the remedial alternatives for the Site and EPA's proposed interim remedial action for OU-1. After issuing the Proposed Plan, EPA held a public comment period from April 21, 2014 to May 22, 2014, and in conjunction with IDEM, held a public meeting on April 29, 2014. When the Proposed Plan was issued, EPA mailed a fact sheet to area residents informing them about the Proposed Plan, available information in the public repositories (RI, Focused FS, Interim Action Proposed Plan), and the opportunity to comment on that Proposed Plan. EPA did not receive any written comments during the public comment period. Oral comments received during the April 29th public meeting are provided in the Responsiveness Summary, which is included in Appendix C of this Record of Decision.

2.4 Scope and Role of Operable Unit or Response Action

This Interim ROD for OU-1 will be the first remedial action taken at the Site, and will be consistent with the final Site remedial actions. Remediation of source areas contributing to groundwater contamination is being addressed as OU-2, and a final OU-1 ROD will document selection of a final remedy for the contaminated groundwater and associated soil vapor.

During the RI only 2 of the 54 existing sampled residential wells contained TCE at concentrations exceeding MCLs. However, higher levels of contamination had been found elsewhere in the groundwater plume, resulting in previous removal actions to install filters and connect homes to the municipal water supply at multiple locations.

The Interim Groundwater remedial area includes all properties currently occupied and not connected to a municipal water supply, located within the plume area or in an approximate 500 foot buffer from Lusher Site plumes or potentially downgradient of the plume (refer to Figure 3). This is estimated as 72 properties. Groundwater contamination within the separate Gemeinhardt plume is not part of the Lusher Site, and therefore not part of the interim remedial action. The small plume east of the Gemeinhardt plume is part of the Lusher Site.

The 500 foot buffer zone is being used to be conservative and protective due to uncertainties in delineating the plume and its future movement. These uncertainties derive from the nonhomogeneous nature of the Site geology and groundwater variations resulting from the seasonal climate and weather patterns. In addition, chemical and physical processes such as diffusion, advection-dispersion, adsorption and absorption contribute to uncertainties of plume movement. Groundwater will follow sinuous flow paths in heterogeneric aquifers due to

differences in hydraulic conductivity. The Site area has a mixture of sands and gravels with intermittent silts and clays and that affects groundwater/contaminant flow directions in, and downgradient of, the plume.

Two areas within the Site boundary have been excluded from the interim groundwater remedial action. The first of these, the northeast portion of the Site, is shown on Figure 3. Contamination has not been detected on this portion of the Site and it is located cross- or up-gradient from the plume. The second area is located in the southeast portion of the Site, up-gradient of the plume.

Figure 3 shows properties where Interim Remedy water connections are planned at an estimated 72 properties. These properties are without a water account and in areas where municipal water is not currently available. The estimated number of properties with buildings requiring connection to municipal water is based on (1) geographic information system data obtained from Elkhart County and (2) a list of addresses with water accounts obtained from the City of Elkhart Public Works Department. The actual number may vary as buildings are condemned, demolished, abandoned, or constructed; and will be verified during the remedial design and construction phases.

During the RI, the VI exposure pathway was investigated and determined to be a complete pathway. A vapor intrusion area of concern is illustrated in Figure 3. This area is roughly centered on the intersection of West Indiana Avenue and West Franklin Street. Available data indicate that approximately 200 buildings are present in this area. The VI area of concern was delineated using a multi-step approach based on lines of evidence developed from data evaluation of shallow groundwater, soil vapor, sub-slab and indoor air sample results from 29 properties. Based on the data collected, buildings outside the VI area of concern are not exposed to Site-related VI risk and hazards. EPA's sampling determined that current unacceptable long-term exposures to VI exist only at approximately 45% of the buildings in the VI area of concern. EPA then evaluated the cost-effectiveness of sampling and re-sampling of the 200 buildings in the VI area of concern over 10-year period. EPA concluded that it is more cost-effective to pre-emptively mitigate all of the buildings as part of this remedial action, rather than to continue to sample over half of the buildings indefinitely. Therefore, the alternatives to address vapor intrusion are assumed to apply to all buildings within the vapor intrusion area of concern.

Site-related TCE shallow groundwater contamination plume is illustrated in Figure 3.

2.5 Site Characteristics

Physical Characteristics and Land Use

The Lusher Site is relatively flat, with little elevation change except near the St. Joseph River, the Site's northern boundary. At the river's edge, the surface elevation steeply drops approximately 20 feet to the water level. The average elevation throughout the Site is approximately 750 feet above mean sea level. The principal source of groundwater in Elkhart County is the unconsolidated outwash sand and gravel deposits known as the St. Joseph Aquifer. The City of Elkhart obtains water from this aquifer. Based on the groundwater monitoring wells installed during the RI, the depth to groundwater is approximately 20 feet below ground surface

(bgs) at the southern Site boundary (Hively Street) and decreases northward as groundwater discharges to the St. Joseph River at the northern Site boundary. Groundwater flow direction is generally horizontal toward the St. Joseph River.

Residents and businesses in the City of Elkhart obtain drinking water from both a municipal water supply and private wells. EPA identified at least 94 private wells within the boundaries of the Lusher Site.

Historical aerial photographs from the National Aerial Survey Center/Visual Image Presentation, U.S. Geological Survey (USGS), and U.S. Department of Agriculture (USDA)/Farm Service Administration from 1938, 1965, 1967, 1973, 1981, and 1987 show the Lusher Site over time. The aerial photographs indicate that businesses along the north side of Lusher Avenue were built on former railroad property. The 1938 aerial photograph shows that the area from Lusher Avenue north to Franklin Street contained staged railroad cars and a central building. On the 1938 aerial photograph, most of the southern and northwestern portions of the Lusher Site consist of farmland, with some residential properties. The apparent beginnings of some industrial activity at the parcel currently owned by Elkhart Plating on 14th Street are discernible on the 1938 aerial photograph.

By 1965, railcars were no longer staged south of the railroad tracks and several businesses were developed along Lusher Avenue, including the scrap metal yard (currently Heavy Metal Recycling). Several large industrial/commercial properties were developed near the southeastern portion of the Lusher Site, south of Fieldhouse Avenue and east of 18th Street. Early development of the Elkhart WWTP is visible along Nappanee Street near the St. Joseph River. Some development also is visible between the railroad tracks and Franklin Street.

By 1973, the Elkhart WWTP had expanded to its current configuration, and additional residential/commercial buildings were constructed in the northwest portion of the Lusher Site. The large farm field in the northeast corner by Hively Avenue and Nappanee Street was developed with industrial/commercial buildings, and several additional building and businesses were developed along the north side of Lusher Avenue. A shopping center was developed on the northeast corner of Franklin Street and Nappanee Street, and limited development was beginning south of Franklin Street and north of the railroad tracks.

By 1981, additional development is visible along Lusher Avenue and Franklin Street, with some development along Nappanee Street north of West Indiana Avenue. By this time, much of the vacant land had been developed. Minimal additional development took place between 1981 and 2011, although businesses may have changed or ceased operation during the last 30 years.

Geology

Regionally, Elkhart, Indiana, is part of the St. Joseph River basin whose surficial geology predominantly is influenced by glacial and post-glacial activity. Quaternary glacial deposits in the St. Joseph River basin have been documented to be up to 450 feet thick. The Elkhart area is part of the Kankakee Lowland, a broad, flat region that extends from Illinois across northwestern Indiana and into southwestern Michigan.

The Kankakee Lowland is split into two distinct floodplains: the Kankakee River floodplain (extending southwest from South Bend) and the St. Joseph River floodplain (extending east of South Bend). The St. Joseph River floodplain consists of Holocene alluvium underlain by thick outwash sand and gravel. The St. Joseph River basin has been influenced by a complex glacial history, including several glacial advances and retreats that deposited layers of interbedded clayey till and outwash sand and gravels. Bedrock underlying the St. Joseph River basin deposits predominantly consists of horizontal, layered Paleozoic limestone, dolomite, sandstone, siltstone, and shale. Beneath these rocks are Precambrian igneous basement rocks primarily composed of granite and basalt. Bedrock in the northwestern portion of the St. Joseph River basin consists of alternating beds of black and gray-green Ellsworth Shale located at approximately 600 feet above mean sea level. The Site-specific geology was evaluated during the Phase I RI activities. The underlying geology was confirmed by EPA to be consistent with the unconsolidated Pleistocene glacial deposits overlying shale bedrock. The glacial deposits primarily consist of unconsolidated, fine- to coarse-grained sand and sand and gravel outwash with discrete or discontinuous silt and clay lenses to approximately 150 feet bgs. The RI soil boring logs were used to generate geologic cross-sections at locations across the Lusher Site. Figures 4 through 8 show the geologic cross-section illustrating the underlying stratigraphy.

Generally, the geological cross sections show four major unconsolidated soil types underlying the Site:

- Surficial man-made fill material (comprised predominantly of sand and/or gravel with minimal deposits of silt and debris)
- Fine, medium, and coarse-grained sand
- Fine, medium, and coarse-grained sand and gravel
- Discontinuous layers of clay (silt and clay)

Surficial sandy fill material was encountered at the ground surface at several locations with thickness varying from 2 to 16 feet. At all drilling locations, the native soil type encountered at the ground surface (or underlying the surficial fill material) consisted of fine- to coarse-grained sand indicative of glacial outwash deposits. At most drilling locations, these deposits extended to the top of the bedrock surface.

Silt and clay layers of varying thickness (less than 1 foot to up to 40 feet thick) were sometimes encountered within the sand deposits. As the cross-sections show, few connections exists between the clay layers, confirming their discontinuity under the Lusher Site. The silt and clay layers within the sand deposits are typical of valley fill processes. At several drilling locations, the lower portions of the unconsolidated glacial deposits contained more coarse-grained material that was logged as coarse-grained sand and gravel. These coarser deposits seemed to thicken toward the St. Joseph River and typically were present on top of the underlying bedrock surface. Where encountered, bedrock below the Lusher Site was observed to consist of dense, essentially horizontal, Mississippian- and Devonian-aged shale.

Groundwater

The principal source of groundwater in Elkhart County is the unconsolidated outwash sand and gravel deposits known as the St. Joseph Aquifer. The City of Elkhart obtains water from this aquifer. Drinking water is supplied by both a public water supply system (Northwest, North Main, and South well fields) and private wells. The St. Joseph Aquifer is composed of fine- to medium-grained sand, with zones of coarse sand and gravel. Interspersed within these deposits are thin clay or till units of limited areal extent. The St. Joseph Aquifer generally thickens from south to north and varies from 20 feet thick near the southern boundary of the St. Joseph River basin to approximately 400 feet thick over the buried bedrock valley at the western edge of Elkhart County. Numerous high-capacity industrial, municipal, and irrigation wells obtain water from the St. Joseph Aquifer; it is one of the major aquifer systems in Indiana. This aquifer generally offers excellent groundwater availability (100 to 1,500 gallons per minute) but is highly susceptible to groundwater contamination. The horizontal hydraulic conductivity (K) of the upper portion of the St. Joseph Aquifer is estimated to be approximately 170 feet per day (6.0E-02 centimeter per second [cm/s]) within 1 mile of the St. Joseph River. Transmissivity is estimated as high as 57,000 square feet per day.

An active hydraulic connection is believed to exist between the St. Joseph Aquifer and the St. Joseph River, with upward vertical gradients near the river, indicating a gaining stream. The St. Joseph River flows from east to the west near the Site and eventually empties into Lake Michigan. A man-made dam located about 1.86 mile upstream in Elkhart stabilizes the local river level, which could create local zones of recharge and affect groundwater elevations in the area. Based on the groundwater monitoring wells installed during the RI, the depth to groundwater is approximately 20 feet bgs at the southern Site boundary (Hively Street) and decreases northward as groundwater discharges to the St. Joseph River at the northern Site boundary.

Measured vertical hydraulic gradients between shallow water table wells and deeper aquifer wells are generally small, ranging from a downward gradient of about 0.005 foot per foot (ft/ft) to an upward gradient of about 0.005 ft/ft. Vertical hydraulic gradients usually are downward in recharge areas, which are generally located away from major streams and upwards in discharge areas, which are typically located near major streams. An upward hydraulic gradient is obvious near the St. Joseph River where artesian conditions were observed at MW-016-I.

Remedial Investigation for Vapor Intrusion

During the RI, the VI exposure pathway (groundwater contaminated with VOCs that may volatilize and travel through soil and migrate into buildings) was investigated and determined to be a complete pathway. The VI area of concern is illustrated in Figure 3. This area is roughly centered on the intersection of West Indiana Avenue and West Franklin Street. The RI concluded that only four VOCs, TCE, PCE, 1,1-DCA and chloroform had a complete VI pathway. There are some uncertainties about the exact number of properties subject to VI. The VI pathway was confirmed to be complete in 72-75 percent of the residences from which paired sub-slab and indoor air samples were collected. For the residences where the VI pathway is complete, none of

the concentrations exceeded the Region 5 removal action levels that would require immediate action.

Available data indicate that approximately 200 buildings are present in this area. The VI area of concern was delineated using a multi-step approach based on data evaluation of shallow groundwater, soil vapor, sub-slab and indoor air sample results. This area is where most of the Site-related risks and hazards are expected to occur. Based on the data, buildings outside the VI area of concern are not exposed to Site-related risk and hazards.

RI Objectives

The primary objective of the OU1 RI field sampling efforts was to collect the data necessary to evaluate the potential residential health risks presented by exposure to Site-related VOCs via ingestion, skin absorption, and inhalation of vapors from well water and inhalation through vapor intrusion from contaminated groundwater. This evaluation required the determination of the nature and extent of the shallow groundwater contamination through the collection of private well samples and air samples (sub-slab and indoor air).

RI Results

Groundwater

The source(s) contributing to the Lusher Street groundwater plume and to actual or potential VI have not been fully identified. In 2009, EPA conducted a preliminary investigation for the Lusher Site and identified nine potential source areas, which are discussed in detail in the final RI report. EPA is continuing to actively evaluate these and other potential sources.

The Lusher Site groundwater plume primarily contains chlorinated VOCs, including PCE; TCE; chloroform; 1,1- DCA; and vinyl chloride. Historically, 1,1,1-TCA; 1,1- DCE; and 1,2-DCE have also been detected in groundwater at this Site. Chlorinated VOCs were commonly used as industrial solvents.

Table 1 presents information about TCE, the only groundwater COC for the residential well groundwater ingestion. The locations and concentrations of all the VOC detections are illustrated in Figures 10 through Figure 20 of this ROD. The concentrations of VOC detections are reported in the unit micrograms per liter (µg/L), which is equivalent to parts per billion (ppb). These results indicate that the shallow groundwater at the water table (groundwater located near the ground surface) contains significant concentrations of VOCs that present a risk of potential vapor intrusion into overlying residences.

The primary risk driver for residential well groundwater ingestion is TCE. A depiction of the extent of TCE contamination at the water table is included in Figure 12 of this ROD. Figure 16 depicts the TCE concentrations in shallow groundwater. Refer to Table 1 for the summary data of residential well samples, VAS samples, monitoring well samples, and water table samples.

Sub-slab soil/Indoor Air samples

A total of 145 vapor intrusion (VI) investigation samples were collected from 29 residences, including 28 soil vapor samples collected from just above the water table, 60 sub-slab samples, 51 indoor air samples, and 6 outdoor air samples. TCE was detected in indoor air at concentrations ranging from 0.43 $\mu g/m^3$ to 53 $\mu g/m^3$. Of the 29 residences where indoor air samples were collected, TCE was detected at 10 residences. EPA determined that at some residences there is a correlation between sub-slab soil vapor concentrations of TCE and indoor air concentrations due to VI. However given the potential that non-Site-related contaminant sources may be present in indoor air, EPA intends to rely primarily on sub-slab soil vapor data for determining the potential for vapor intrusion. Please refer to Table 2, for the summary data of soil vapor, sub-slab, and indoor air samples for the vapor intrusion COCs.

Twenty-seven (27) of the 29 properties sampled had paired sub-slab and indoor air samples collected during at least one of the sampling events. Of the other two properties: one was a crawl space that was sampled only once, and the other was a sub-slab sample.

The VI pathway was considered complete only if a Contaminant of Interest (COI) was present both in sub-slab and indoor air samples with a greater sub-slab concentration than indoor air concentration. The VI Pathway was considered to be possible if a COI was detected in sub-slab samples above the screening level regardless of indoor air concentration. The VI pathway was considered incomplete when the sub-slab concentrations did not exceed screening levels. If the indoor air sample concentration was not at least one-tenth the sub-slab sample concentration, an indoor (household) source(s) was considered only potentially present. Indoor air samples with concentrations exceeding the sub-slab sample concentrations were considered to indicate a potential indoor source and not considered to be due to groundwater contamination at the Site.

Of the 29 residences sampled five (17 percent) had an incomplete VI pathway; three (10 percent) had a possible VI pathway, and 21 (73 percent) had a complete VI pathway. TCE was the COI responsible for all but one (96 percent) of the complete or possible VI pathways; chloroform was responsible for the other. Additionally, chloroform had complete VI pathways at five properties; PCE at three properties, and 1,1-DCA at one property.

Other chemicals not identified as COIs were detected in indoor air samples at concentrations exceeding screening levels, but these chemicals were not detected at concentrations exceeding screening levels in sub-slab samples. In addition, in many cases, these chemicals were detected in sub-slab samples at concentrations below indoor air sample concentrations, indicating likely indoor sources. There are many potential household sources for VOCs in indoor air, including paints and other coatings, paint thinners, cleaning compounds, aerosol sprays, pesticides, dry-cleaned items, hobby products, personal hygiene products, and gasoline (for automobiles and outdoor power equipment). Most potential mitigation approaches are ineffective against indoor (household) sources.

When the data from the 29 sampled properties were evaluated against Region 5 VI Guidance, 13 of the 29 properties (45%) were in Category 3 (Mitigation) for at least one sampling event. Eleven (11) of the 29 properties (38%) were in Category 2 (Re-sampling), and the remaining 5 properties (17%) were in Category 1 (No Further Action). Note that the Region 5 VI Guidance is

based on an excess cancer risk of 1E-5 and non-cancer HI of 1, whereas the screening levels used in the rest of the RI are based on an excess cancer risk of 1E-6 and a HI of 1.

Ecological Risk

Based on the Screening Level Ecological Risk Assessment (SLERA), aquatic receptors exposed to surface water in the St. Joseph River are not at risk for adverse effects from groundwater discharge from the Site. A habitat evaluation concluded that two habitats that require evaluation are present at the Lusher Site: the aquatic habitat of the St. Joseph River and the forested wetland next to the St. Joseph River. Specific endpoints identified for the SLERA were benthic and aquatic communities in the St. Joseph River and the protection of threatened and endangered species. It is possible that, as the contamination plume continues to move, groundwater concentrations adjacent to the river may increase and discharge greater levels of contamination into the river. However, this is fairly unlikely, as the groundwater moves relatively quickly and the spills are expected to have occurred a long time ago.

2.5.1 Conceptual Site Model

A conceptual site model (CSM) for human health was developed during the RI/FS to guide the identification of appropriate exposure pathways and receptors for evaluation in the risk assessment. The CSM includes multiple potential source areas (PSA) with multiple releases, possibly at different times. PSAs will be addressed as part of Source Control, OU-2. A general identification of exposure pathways, exposure routes, and receptors is illustrated in the CSM in Figure 2.

Human receptors could be exposed to these COIs through two primary routes: inhalation of indoor vapors migrating from contaminated groundwater (VI) and direct ingestion of groundwater as drinking water. Exposure to groundwater that has migrated to surface water is also a potential exposure route; however it has not been evaluated for this interim remedy (it will be considered further for the final remedy).

The main contaminant currently present in groundwater is TCE, although other VOCs also have been detected. Multiple contamination sources generated multiple groundwater contamination plumes which are comingled. One or more of the potential sources have created a TCE plume at the water table.

2.6 Current & Potential Future Land & Resource Uses

The Site is composed of mixed residential, commercial, and industrial areas bisected by a railroad track and served by a mix of private wells and public water supply wells. The groundwater plume and buffer zone currently encompass both residential and commercial/industrial mixed land. The future use of land at the Site is also expected to be residential and commercial/industrial. Over time, the number of residential properties is expected to remain the same.

2.7 *Summary of Site Risk*

2.7.1 *Summary of Human Health Risk Assessment*

A human health risk assessment (HHRA) estimates potential human health risks posed by a site if no cleanup action is taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action.

This OU-1 interim action ROD addresses the human health exposures caused by the current potential exposures to groundwater contamination and vapor intrusion at the Site, therefore, the summary of Site risks discussion is limited to risks from those exposures.

Ingestion of contaminated groundwater and exposure to vapors from shallow groundwater contamination north of the railroad presents the greatest risk to humans at the Site. A depiction of the composite groundwater contamination plume is presented in Figure 3 and is based on combining various VOC plumes (see Figures 10, 11, 12, 14, 15, 16 & 17). In additional to TCE, PCE, chloroform and 1,1 DCA are also primary vapor intrusion contaminants.

The HHRA was prepared using EPA's Risk Assessment Guidance for Superfund, which evaluates the potential current and future exposure scenarios at the Site. To estimate the risk to human health at a Superfund site EPA guidance outlines a four-step process highlighted in the boxed text *What is Human Health Risk and How is it Calculated* below.

Groundwater

The primary risk driver in groundwater is provided in the table below.

Table 3 - Summary of Groundwater – Risk Drivers (COCs) Only

COC	Remedial Action Level	Maximum Concentration in Private Well Samples	Maximum Concentration in Monitoring Well Samples
Trichloroethene (TCE)	5 µg/l	25 µg/l	370 µg/l

Note: All concentrations are in micrograms per liter (µg/l)

This interim action addresses the current exposure to groundwater contaminated with TCE above Federal MCLs. TCE was the contaminant most frequently found above MCLs in non-private well groundwater samples collected during the RI. Several other VOCs (1,1-DCA, 1,1-DCE, benzene, cis-1,2-DCE, methylene chloride, and vinyl chloride) were also detected at concentrations exceeding the MCLs in groundwater samples (other than the private wells) collected during the RI.

Vapor Intrusion

Primary risk drivers for VI are provided in the table below.

Table 4- Summary for Vapor Intrusion – Risk Drivers (COCs) only

Analyte	Max concentration ($\mu g/m^3$)	Screening level used in Risk Assessment ($\mu g/m^3$)	Screening level – per Region 5 Vapor Intrusion Guidance (10^{-5} cancer risk, HI=1) ($\mu g/m^3$)
Trichloroethene (TCE)	12	0.43	2.1
Tetrachloroethene (PCE)	48	9.4	42
Chloroform	14	0.11	1.1
1,1-Dichloroethane (DCA)	2.8	1.5	15

Notes:

a. All results and screening levels are for indoor air at residential properties.
b. The screening level used in the risk assessment was the lowest of the Vapor Intrusion Screening Level (VISL) Calculator (May 2012 RSLs) and State Guidance.
c. The screening level per Region 5 Vapor Intrusion Guidance is calculated using the same VISL Calculator using May 2012 RSLs.

Multiple Lines of Evidence

The RI evaluated VI risks in accordance with the EPA Region 5 Vapor Intrusion Guidance Manual. This evaluation was performed on data from the 29 sampled properties from which sub-slab or crawl space, and indoor air samples were collected during three sampling events. These four contaminants were shown to present a VI risk as indicated through the lines of evidence from the data collected.

A discussion of the multiple lines of evidence reviewed by EPA to evaluate vapor intrusion at the Site follows:

Shallow groundwater

A groundwater contamination plume exists at the Site. The plume has been determined to contain Site-related compounds of sufficient volatility and toxicity to pose a risk to human health via vapor intrusion. The shallow TCE groundwater contamination plume underlies a number of residences.

Sub-slab soil vapor

Sub-slab soil vapor samples have been collected beneath a number of residences located within the TCE plume at the Site, and Site-related contaminants have been identified in sub-slab soil vapor at a number of locations. At certain residences, Site-related contaminants have been identified in sub-slab soil vapor at concentrations which represent a potential threat to human health (unacceptable cancer risk and/or non-cancer risk) should the vapor enter the residence. The concentrations of sub-slab soil vapor contamination potentially entering the residences have been evaluated by using an "attenuation factor" from sub-slab soil vapor to indoor air of 0.1. This attenuation factor represents the amount of sub-slab soil vapor contamination that is expected to be able to migrate from the sub-slab space into indoor air, where residents could be

exposed to the contamination in vapor form. This attenuation factor is considered to be a reasonably conservative estimate based on the current understanding of VI. See EPA Region 5 Vapor Intrusion Guidebook

Indoor air

Indoor air samples have been collected at a number of residences at the Site. Certain indoor air samples have exhibited Site-related contaminants at concentrations which pose an unacceptable risk to human health (unacceptable cancer risk and/or non-cancer risk), although it is not certain in all of these cases whether the levels are due solely to Site-related contaminants.

Multiple lines of evidence conclusion

Based on multiple lines of evidence (groundwater data, sub-slab data, and indoor air data) from the sampling event of 29 residences, there is a potential for Site-related contaminants from contaminated groundwater to migrate to indoor air at concentrations that could pose an unacceptable risk to human health. However, none of the properties present a VI risk that would be considered an acute hazard or require emergency response action.

The vapor intrusion sampling indicates that 45% of the 29 properties sampled require mitigation, and 38% of the 29 sampled properties require re-sampling to determine if the risk from VI has increased such that mitigation will be needed in the future. For purposes of evaluating remedial alternatives, EPA assumed that roughly these same percentages apply to the estimated 200 buildings in the VI area of concern. EPA evaluated the projected costs of regular re-sampling, re-evaluation and re-mobilization for 38% of the buildings and concluded that it is more cost-effective to pre-emptively mitigate all of the buildings in the VI area of concern, rather mitigate just those that currently indicate mitigation is appropriate. Therefore, the alternatives to address VI apply to all buildings within the vapor intrusion area of concern.

WHAT IS HUMAN HEALTH RISK AND HOW IS IT CALCULATED?

A Superfund human health risk assessment estimates the "baseline risk." This is an estimate of the likelihood of developing cancer or non-cancer health effects if no cleanup action were taken at a site. To estimate baseline risk at a Superfund site, EPA undertakes a four-step process:

Step 1: Analyze Contamination
Step 2: Estimate Exposure
Step 3: Assess Potential Health Threats
Step 4: Characterize Site Risk

In Step 1, EPA looks at the concentrations of contaminants found at a site as well as past scientific studies on the effects these contaminants have had on people (or animals, when human studies are unavailable). A comparison between site-specific concentrations and concentrations reported in past studies helps EPA to determine which contaminants are most likely to pose the greatest threat to human health.

In Step 2, EPA considers the different ways that people might be exposed to the contaminants identified in Step 1, the concentrations that people might be exposed to, and the potential frequency and duration of exposure. Using this information, EPA calculates a "reasonable maximum exposure" (RME), which portrays the highest level of exposure that could reasonably be expected to occur.

In Step 3, EPA uses the information from Step 2 combined with information on the toxicity of each chemical to assess potential health risks. EPA considers two types of risk: cancer and non-cancer. The likelihood of any kind of cancer resulting from a Superfund site is generally expressed as an upper bound probability; for example, a 1 in 100,000 (1×10^{-5}) chance of developing cancer from site-related exposures. In other words, for every 100,000 people that could be exposed, one extra cancer may occur as a result of exposure to site contaminants. An extra cancer case means that one more person could get cancer than would normally be expected to from all other causes. For non-cancer health effects, EPA calculates a "hazard index." The key concept here is that a "threshold level" (measured usually as a hazard index of equal to 1) exists below which non-cancer health effects are no longer predicted.

In Step 4, EPA determines whether site risks are great enough to cause health problems for people at or near the Superfund site. The results of the three previous steps are combined, evaluated and summarized. EPA adds up the potential risks from the individual contaminants and exposure pathways and calculates a total site risk.

2.7.2 Data Quality and Usability

Data were evaluated based on completeness, holding times, initial and continuing calibrations, surrogate recoveries, internal standards, compound identification, laboratory and field quality assurance/quality control (QA/QC) procedures and results, reporting limits, documentation practices, and application of validation qualifiers. Analytical data collected during the RI was considered to be acceptable for use in the HHRAs.

2.7.3 Identification of Contaminants of Concern

For potentially carcinogenic risk results, COCs are identified as those Contaminants of Potential Concern (COPCs) that result in target risk above $1E^{-6}$. For non-carcinogenic hazard results, COCs are identified as those COPCs that result in toxic-endpoint specific HI greater than 1. Risks are calculated at the exposure point(s). An exposure point concentration (EPC), is an estimate of the true arithmetic mean concentration of a chemical in a medium at an exposure point and is discussed in Section 2.7.5.

2.7.4 Exposure Assessment

The purpose of the exposure assessment is to predict the magnitude and frequency of potential human exposure to each of the COPCs retained for quantitative evaluation in the HHRA. The current and future exposed human population includes dwellers of the residential and commercial/industrial Site properties above the plume. Exposure to Site contamination would occur through ingestion, inhalation, direct contact with contaminated water from private groundwater wells, and inhalation of indoor contaminant vapors.

2.7.5 Exposure Point Concentrations

Exposure points are located where potential receptors may contact COCs from the Site. The EPA estimated the concentration of COCs in the environmental medium that receptors contact. Both measured and modeled EPCs scenarios were developed. The approaches used to

calculate EPCs under the two scenarios are presented in the HHRA. EPCs were calculated following the methods and recommendations provided in EPA's risk assessment guidance.

2.7.6 Toxicity Assessment

The purpose of the toxicity assessment is to assign toxicity values to each contaminant evaluated in the risk assessment. The toxicity values are used in conjunction with the estimated doses to which a human could be exposed in order to evaluate the potential human health risk associated with each contaminant. In evaluating potential health risks, both carcinogenic and non-carcinogenic health effects were considered.

Cancer slope factors (CSFs) are developed by the EPA under the assumption that the risk of cancer from a given chemical is linearly related to dose. CSFs are developed from laboratory animal studies or human epidemiology studies and classified according to route of administration. The CSF is expressed as $(mg/kg/day)^{-1}$ and when multiplied by the lifetime average daily dose expressed as mg/kg/day will provide an estimate of the probability that the dose will cause cancer during the lifetime of the exposed individual.

The toxicity criteria used to evaluate potential non-carcinogenic health effects are reference doses (RfDs). The RfD is expressed as mg/kg/day and represents that dose that has been determined by experimental animal tests or by human observation to not cause adverse health effects, even if the dose is continued for a lifetime. The procedure used to estimate this dose incorporates safety or uncertainty factors that assume it will not over-estimate this safe dose.

2.7.7 Risk Characterization

For carcinogens, risks are generally expressed as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to the carcinogen. Excess lifetime cancer risk is calculated from the following equation:

$$Risk = CDI \times SF$$

Where:

Risk = a unit less probability (e.g., $2x10^{-5}$) of an individual developing cancer
CDI = chronic daily intake averaged over 70 years (mg/kg-day)
SF = slope factor, expressed as $(mg/kg\text{-}day)^{-1}$

These risks are probabilities that are expressed typically in scientific notation (e.g., $1x10^{-6}$). An excess lifetime risk of $1x10^{-6}$ indicates that an individual experiencing the reasonable maximum exposure (RME) estimate has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure. This is referred to as excess lifetime cancer risk because it would be in addition to the risks of cancer individuals face from other causes such as smoking or exposure to too much sun. The chance an individual developing cancer from all other causes has been estimated to be as high as one in three. EPA's generally-acceptable risk range for site-related exposures is $1x10^{-4}$ to $1x10^{-6}$.

The potential for non-carcinogenic effects is evaluated by comparing an exposure level over a specified time period (e.g., a lifetime) with the RfD derived for a similar exposure period. An RfD represents a level that an individual may be exposed to that is not expected to cause any adverse effect. The ratio of exposure to toxicity is called a hazard quotient (HQ). An HQ less than 1 indicates that a receptor's dose of a single contaminant is less than the RfD, and that toxic non-carcinogenic effects from that chemical are unlikely. The hazard index (HI) is generated by adding the HQs for all COCs to which a given individual may reasonably be exposed that affect the same target organ (e.g., liver) or that act through the same mechanism of action within a medium or across all media. An HI of 1 or less indicates that based on the sum of all HQs from different contaminants and exposure routes, toxic non-carcinogenic effects from all contaminants are unlikely. An HI greater than 1 indicates that site-related exposures may present a risk to human health. When the total site HI is greater than 1 for any receptor, a more detailed evaluation of potential non-carcinogenic effects based on specific health, or target endpoints (e.g., liver effects, neurotoxicity) is performed.

The HQ is calculated as follows:

Non-cancer HQ = CDI/RfD

Where:

CDI = chronic daily intake
RfD = reference dose

CDI and RfD are expressed in the same units and represent the same exposure period (i.e. chronic, subchronic, or short-term).

Tables 5 through Table 8 provide a summary of the potential carcinogenic and non-carcinogenic risks from each of the 80[1] properties COCs and potential receptors.

Table 5 - Summary of RME Residential Risks and Hazards
(Includes exposure through ingestion, dermal contact, inhalation and vapor intrusion)

Risk Range	Number of properties
Cancer risk less than or equal to $1x10^{-6}$ to $1x10^{-4}$ Non-cancer risk HI<1	34
Cancer risk between $1x10^{-6}$ to $1x10^{-4}$ Non-cancer risk HI>1	38
Cancer risk greater than $1x10^{-6}$ to $1x10^{-4}$ Non-cancer risk HI>1	3

[1] *The Human Health Risk Assessment (HHRA) Report conservatively characterizes risks to hypothetical human receptors potentially exposed to constituents detected in environmental media at 80 properties, 75 residential and 5 industrial/commercial (organized into five groups) at the Lusher Street site. Please refer to the HHRA for more details.*

Table 6 - Summary of RME Industrial/Commercial Risks and Hazards
(Includes ingestion, inhalation and vapor intrusion)

Risk Range	Number of properties
Cancer risk less than or equal to $1x10^{-6}$ to $1x10^{-4}$ Non-cancer risk HI<1	4
Cancer risk between $1x10^{-6}$ to $1x10^{-4}$ Non-cancer risk HI>1	1
Cancer risk greater than $1x10^{-6}$ to $1x10^{-4}$ Non-cancer risk HI>1	0

Table 7 - Summary of RME Utility Worker Risks and Hazards
(Includes dermal contact and inhalation)

Risk Range	Number of properties
Cancer risk less than or equal to $1x10^{-6}$ to $1x10^{-4}$ Non-cancer risk HI<1	64
Cancer risk between $1x10^{-6}$ to $1x10^{-4}$ Non-cancer risk HI>1	16
Cancer risk greater than $1x10^{-6}$ to $1x10^{-4}$ Non-cancer risk HI>1	0

Table 8 - Summary of RME Construction Worker Risks and Hazards
(Includes dermal contact and inhalation)

Risk Range	Number of properties
Cancer risk less than or equal to $1x10^{-6}$ to $1x10^{-4}$ Non-cancer risk HI<1	63
Cancer risk between $1x10^{-6}$ to $1x10^{-4}$ Non-cancer risk HI>1	17
Cancer risk greater than $1x10^{-6}$ to $1x10^{-4}$ Non-cancer risk HI>1	0

Recreational Risks and Hazards:

No significant risks or hazards were identified based on qualitative evaluation of potential recreational exposure in the St. Joseph River.

2.7.8 *Basis for Taking Action*

The response action selected in this OU-1 interim action ROD is necessary to protect the public health or welfare or the environment from the actual or threatened releases of hazardous substances to the environment. The interim action is intended to achieve a significant reduction in risk posed by contaminated water use through private wells and vapor intrusion, while a final remedial solution for the Site is being developed.

2.8 *Remedial Action Objectives*

RAOs are goals specific to media or OU for protecting human health and the environment. They are based on unacceptable risks, anticipated current and future land use, objectives of the action and expectations and statutory requirements.

RAOs for the planned interim action RAOs for OU-1 are as follows:

RAO 1: Prevent human exposure to COCs in groundwater through ingestion, dermal contact, and inhalation above protective levels.

RAO 2: Prevent human exposure to COCs in indoor vapor associated with soil and groundwater contamination above protective levels.

The purpose of the selected interim action is to prevent ingestion of contaminated groundwater from private residential and commercial/industrial wells and to mitigate exposure to volatized Site-related contaminants to indoor air at residential and commercial/industrial buildings.

The proposed remedial action levels are provided in the tables below:

Table 9 - Groundwater Remedial Action Levels

COC	Remedial Action Level/ MCL
Trichloroethene (TCE)	5 µg/l

Table 10 - Vapor Intrusion Remedial Action Levels

COC	Residential Remedial Action Level (µg/m^3)	Commercial/ Industrial Remedial Action Level (µg/m^3)	Max concentration observed (µg/m^3)
Trichloroethene (TCE)	2.1	8.8	12
Tetrachloroethene (PCE)	42	180	48
Chloroform	1.1	5.3	14
1,1-Dichloroethane (DCA)	15	77	2.8

Notes:

a. Vapor Intrusion Remedial Action Levels are based on the Region 5 Vapor Intrusion Guidebook. They are set at the $1x10^{-5}$ additional cancer risk, and a non-cancer Hazard Index of 1.

b. Indoor air goals are applicable only to those chemicals for which a complete vapor intrusion pathway exists, as CERCLA cannot address contamination which is not Site-related. The RI Report identified complete vapor intrusion pathways for four chemicals identified as risk drivers / COCs: TCE, PCE, chloroform, and 1,1-DCA.

The interim remedial actions are intended to address current threats in the short-term and will not perform any groundwater remediation to return it to its beneficial use. The final Site OU1 remedy will address contaminated groundwater and will be selected in a subsequent decision document after the full nature and extent of the groundwater contamination is characterized.

2.9 Description of Alternatives

This section presents the interim remedial alternatives for OU-1, which are further explained in the Focused Feasibility Study (FFS) Report, dated September 12, 2013. In accordance with the NCP at 40 C.F.R. § 300.430(e)(6), EPA evaluated a no action alternative that serves as the baseline for the evaluation of the other remedial alternatives.

A. INTERIM GROUNDWATER ALTERNATIVES

The groundwater alternatives are intended to meet RAO 1. The main ARAR for the interim groundwater alternatives is the Safe Drinking Water Act (SDWA) MCL. The Indiana Drinking Water Standards for site contaminants of concern are consistent with federal SDWA standards. A complete list of the ARARs considered is included in the FFS report.

Alternative GW-1: No Action

Estimated Capital Cost: $0
Estimated Total O&M: $0
Estimated Present-worth Cost: $0
Estimated Construction Timeframe: None

Under this alternative, no action would be taken to mitigate risk associated with contaminated groundwater.

Alternative GW-2: Filtration Systems and Institutional Controls

Estimated Capital Cost: $500,000
Estimated Total O&M: $1,200,000
Estimated Total Present-Worth Cost: $ 1,700,000
Estimated Construction Timeframe: < 1 year

Alternative GW-2 would involve the installation of activated carbon in-line filters at properties located within the proposed interim groundwater remedial area that are currently occupied and not connected to a municipal water supply. The carbon filters would remove the contaminants and decrease the risks from ingesting and/or inhaling vapors from contaminated drinking water from private wells. Based on property-specific circumstances, either whole-house or point-of-use filters would be installed. For residences, whole-house filters are preferred, but for commercial and industrial facilities, point-of-use filters may be more appropriate. The decision regarding which type of filter would be made during the remedial design phase. Long-term operation and maintenance of the filter systems would be required.

An estimated 72 properties would receive filtration systems under this alternative. The filter systems would require regular and ongoing maintenance, therefore the remedy would require agreements to assure continued access to the residents' homes. In addition, institutional controls (ICs) such as a local ordinance would be required to prevent potable use of untreated groundwater. Newly constructed buildings would be required to connect to municipal water (if available) or have filters installed and maintained. The ICs would also require notification to construction and utility workers of the presence of potentially contaminated groundwater so that they could take appropriate precautions. Because contamination would be left in place, this alternative would require five-year reviews. This alternative would remain in place until the source(s) are controlled and groundwater cleanup goals have been achieved. At this time, it is not known how long the filters would have to remain in place, but it would likely be at least 20 years.

Alternative GW-3: Alternate Water Supply

Estimated Capital Cost: $1,800,000
Estimated Total O&M: $120,000
Estimated Total Present-Worth Cost: $ 2,000,000
Estimated Construction Timeframe: < 1 year

Alternative GW-3 would include connecting to municipal water all currently occupied properties within the proposed interim groundwater remedial area that are not already connected to the City of Elkhart municipal water supply. Properly installed water supplies have long life spans and are expected to last for decades with essentially no maintenance. An estimated 72 properties would be connected to the City of Elkhart municipal water supply. This would involve the extension of water mains and service connections where needed. A health and safety plan would be in place to assure that workers would not be exposed to unacceptable levels of contamination during the hookup process. Following completion of the connections, existing potable water wells would be abandoned in accordance with state and local requirements to prevent future use. ICs similar to those discussed above under Alternative GW-2 would be required and would remain in place until the contamination source(s) are controlled and groundwater cleanup goals are achieved. Because contamination would be left in place, this alternative would require 5-year reviews.

B. VAPOR INTRUSION ALTERNATIVES

The interim VI mitigation alternatives are intended to address RAO 2. The primary ARARs for the vapor intrusion alternatives are Indiana regulations establishing emissions limits for VOCs. A complete list of the ARARs considered is included in the FFS report. Since VI results from contaminated groundwater or soil, the long-term remedy for the VI pathway will likely be to treat or otherwise reduce concentrations of chemicals in groundwater or soil near residences and other buildings so that they no longer pose unacceptable VI risk. Due to the time necessary to identify the source areas and remediate the source areas, the interim VI alternatives will likely be needed for many years. The following sections describe the three interim VI mitigation alternatives.

Alternative VI-1: No Action

Estimated Capital Cost: $0

Estimated Total O&M: $0
Estimated Present-Worth Cost: $0
Estimated Construction Timeframe: None

Under this alternative, no action would be taken to mitigate risk associated with soil vapor intrusion.

Alternative VI-2: Sub-slab Depressurization (SSD) System or Other Vapor Mitigation

Estimated Capital Cost: $460,000
Estimated Total Present-Worth O&M: $360,000
Estimated Total Cost: $ 800,000
Estimated Construction Timeframe: < 1 year

Under Alternative VI-2, active SSD systems would be installed at all residences and buildings in the Interim VI Remedial Area. SSD systems are similar to radon mitigation systems. Each SSD system would require operation and maintenance. An estimated 200 buildings located within the Interim VI Remedial Area are expected to require mitigation. Other vapor mitigation technologies (such as building pressurization) would be considered for implementation during the design phase. Industrial and commercial buildings sometimes have heating, ventilation, and air conditioning systems which can be operated in a manner to control VI risk. Such operations may include increased air changes, or pressurizing the building relative to the soil gas pressure.

ICs also would require that any new residential and commercial construction within the Interim VI Remedial Area be built with a VI mitigation system(s) until EPA determines that VI mitigation systems are no longer required. Ongoing maintenance of the systems and five-year reviews would be required until the mitigation systems are no longer required. This alternative is anticipated to remain in place until the sources are controlled and groundwater cleanup has been implemented such that vapor intrusion no longer presents an unacceptable risk.

Alternative VI-3: SSD System/Vapor Mitigation and Passive Barrier

Estimated Capital Cost: $1,300,000
Estimated Total Present-Worth O&M: $360,000
Estimated Total Cost: $1,700,000
Estimated Construction Timeframe: < 1Year

Alternative VI-3 includes all the components of Alternative VI-2 above and includes the additional application of a passive barrier (such as waterproof paint or a purpose-designed sealer) to basement floors and walls as a physical barrier to prevent vapors from entering buildings. The physical barrier should minimize VI even when the SSD system is not functioning (as in the case of a power outage). The application of a physical barrier in a retrofit situation is relatively new technology, and there is limited long-term experience with it. Where retrofitting has occurred, it has mostly been in industrial/commercial applications. An estimated 200 buildings are expected to require mitigation. This alternative also includes ICs requiring that new buildings in the Interim VI Remedial Area be constructed with VI mitigation systems as long as monitoring results indicate the need for such systems. Ongoing maintenance of the systems and five-year

reviews would be required until monitoring results indicate that mitigation systems are no longer required.

2.10 Summary of Comparative Analysis of Alternatives

As part of the remedy selection process, EPA evaluates each proposed remedy against the nine criteria specified in the National Contingency Plan (NCP), 40 CFR §300.430(e)(9)(iii). The selected alternative must satisfy the threshold criteria set out in the NCP. Next, the primary balancing criteria are used to weigh the tradeoffs or advantages and disadvantages of each of the alternatives. The modifying criteria, which are State and Community Acceptance, are evaluated at the end of the public comment period. This section of the ROD summarizes the nine criteria and the relative performance of each alternative against the nine criteria, noting whether it satisfies the threshold criteria, how it compares with the no action alternative, and whether the state and community support the alternative. For additional information on the comparison of the remedial alternatives, refer to the FS report. Tables 12 and 13 provide a summary of the costs associated with each alternative.

Below is a summary of the nine criteria used to evaluate the remedial alternatives.

THRESHOLD CRITERIA

Overall Protection of Human Health and the Environment

Evaluates whether an alternative provides adequate protection and how risks posed through each pathway are eliminated, reduced or controlled through treatment, engineering controls, or institutional controls.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

Evaluates whether or not an alternative will meet Federal and State environmental ARARs and/or justifies a waiver.

PRIMARY BALANCING CRITERIA

Long-Term Effectiveness and Permanence

Evaluates the ability of an alternative to achieve long-term, effective and permanent protection of human health and the environment over time.

Reduction of Toxicity, Mobility or Volume Through Treatment

Evaluates the extent to which an alternative will reduce the toxicity, mobility, or volume of the Site contaminants through treatment.

Short-Term Effectiveness

Considers the length of time until protection is achieved and the short-term risk or impact to the community, on-site workers and the environment that may be posed during the construction and implementation of the alternative.

Implementability

Considers the technical and administrative feasibility of an alternative, including the availability of materials and services needed to implement that remedy.

Cost

Includes estimated capital, Operations and Maintenance (O&M), and net present worth costs.

MODIFYING CRITERIA

State Acceptance

Addresses whether the State concurs with, opposes, or has no comment on the Preferred Alternative.

Community Acceptance

Considers whether the public concurs with, or opposes, offers different alternatives, or has no comment on the Preferred Alternative described in the Proposed Remedial Action Plan (PRAP).

These evaluation criteria relate directly to the requirements of Section 121 of CERCLA, 42 U.S.C. §9621, for determining the overall feasibility and acceptability of an alternative.

DETAILED ANALYSIS OF THE REMEDIAL ALTERNATIVES

EPA's selected interim actions to address exposures to contaminated groundwater via residential and commercial wells and vapor intrusion at the Site are Alternative 3 (Alternate Water Supply) and Alternative 2 (Vapor Intrusion Mitigation), respectively. A summary of the detailed analysis of the two separate interim action alternatives against the nine criteria is presented below.

INTERIM GROUNDWATER MITIGATION ALTERNATIVES

This section provides a comparative analysis of the interim groundwater alternatives. Table 12 summarizes the comparative analysis. The interim alternatives can be successfully implemented before the source control (OU-2) remedy has been selected and implemented.

1. Overall Protection of Human Health and the Environment

Alternative GW-1 (no action) would provide no improvement over current conditions and no risk reduction, and would not be protective of human health or the environment. Because Alternative GW-1 does not pass this threshold criterion, it was not considered for selection. However, for comparison purposes, Alternative GW-1 is presented and scored within each category on Table 12.

Alternatives GW-2 and GW-3 each would be effective interim remedies and reduce risks associated with direct exposure to contaminated groundwater. Alternative GW-3 would be more protective overall than Alternative GW-2 because, under Alternative GW-2, children and adults could be exposed to contaminated groundwater if filters are not changed or maintained when required.

2. Compliance with Applicable or Relevant and Appropriate Requirements

Alternatives GW-2 and GW-3 would meet ARARs for the interim action. The primary ARARs are the SDWA and the Indiana Drinking Water Standards. A complete list of potential ARARs is included in the final FFS report.

3. Long-Term Effectiveness and Permanence

Alternative GW-3 would be more effective and permanent than Alternative GW-2 because Alternative GW-3 would not require ongoing O&M. Filtration systems need to be sampled and maintained on a regular basis to ensure the system is effective in removing contaminants. Under typical configurations for Alternative GW-2, water used for outdoor purposes would not be filtered, allowing for potential exposure to contaminants. The public water supply in the City of Elkhart, which would provide water under GW-3, presently meets all drinking water criteria and is expected to reliably do so into the future.

4. Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative GW-2 would provide some treatment to reduce the mobility and volume of groundwater contaminants extracted by the residential wells and run through the filtration system. However, neither Alternative GW-2 nor Alternative GW-3 would provide treatment of any significantly amount of contamination in the groundwater plume(s). Both alternatives are intended to prevent or minimize current and future exposure to contaminated groundwater.

5. Short-Term Effectiveness

Alternative GW-2 can be implemented at impacted buildings within a reasonable timeframe (less than one day per location after the equipment has been received and installation scheduled) and would impose minimal risks to workers and the public. Complete implementation of Alternative GW-2 is estimated to take 40 working days; however, this could vary because installation will require scheduling access to work inside the residences requiring filters.

Alternative GW-3 also would have minimal short-term impacts, although it would take longer to install than Alternative GW-2. The duration for complete installation of Alternative GW-3 is estimated at 160 working days, however this could vary depending on how many crews and how much equipment is used on the project. Risks to workers and the public would be slightly higher for Alternative GW-3 due to the heavy construction and trenching involved with the installation of water and service lines. Construction-related risks include the potential for vehicle accidents,

traffic and noise from construction vehicles, increased wear on local roads, and other risks associated with construction work. These impacts could be easily mitigated and managed by implementing a project-specific health and safety plan, keeping excavation areas properly braced, planning truck routes to minimize disturbances to the surrounding community, and other best management practices.

6. Implementability

Both Alternatives GW-2 and GW-3 are proven, readily technically implementable measures, and have been used successfully at other environmental cleanup projects. Qualified commercial contractors with experience are available locally to perform the work. In addition, both alternatives are administratively feasible. Although no permits would be required because the work would be performed at the CERCLA site, a similar level of coordination would be needed with state and local parties during design and construction activities for each alternative.

Alternative GW-2 would include the administrative challenge associated with securing needed access to properties for the required long-term O&M of the filters, and the associated cooperation of properties owners in maintaining the filters. Alternative GW-3 would include the administrative challenge associated with owner cooperation for the abandonment of the private drinking water wells once the municipal water supply is connected.

7. Cost

The estimated present value cost for Alternative GW-2 is $1.7 M and $2.0 million for Alternative GW-3.

8. State/Support Agency Acceptance

The State of Indiana concurs with the selected interim action identified for OU-1 (Alternative GW-3) in this ROD.

9. Community Acceptance

During the public meeting no comments objecting to the selection of the preferred Alternative GW-3 were received.

INTERIM VAPOR INTRUSION MITIGATION ALTERNATIVES

This section provides a comparative analysis of the interim VI mitigation alternatives. Interim VI mitigation alternatives are intended to achieve RAO 2. Table 13 summarizes the comparative analysis. The interim alternatives can be successfully implemented before the source control (OU-2) remedy has been selected and implemented.

1. Overall Protection of Human Health and the Environment

Alternative VI-1 (no action) would provide no improvement over current conditions and no risk reduction, and therefore would not be protective of human health or the environment. Because Alternative VI-1 does not meet this threshold criterion, it was not considered further for selection. For comparison purposes, this alternative is included in the Table 13.

Both Alternatives VI-2 and VI-would be effective remedies as they reduce the risks associated with VI. Alternative VI-3 would be slightly more protective overall than Alternative VI-2 because, in addition to the SSD system, a passive barrier would be added to further abate VI.

2. Compliance with Applicable or Relevant and Appropriate Requirements

Alternatives VI-2 and VI-3 would meet ARARs. The primary ARARs for the vapor intrusion alternatives are Indiana regulations establishing emissions limits for VOCs. Both alternatives VI-2 and VI-3 are expected to generate outdoor VOC emissions which are significantly below the threshold requiring a permit from the State of Indiana. A complete list of potential ARARs is included in the final FFS report.

3. Long-Term Effectiveness and Permanence

Both alternatives are expected to be effective in the long-term. Both alternatives require long-term O&M to maintain full effectiveness. Properly maintained, Alternative VI-3 would be more effective than Alternative VI-2 because of the addition of the barrier. It is expected that long term effectiveness will ultimately be assured by adequate reduction of contamination in the groundwater and source areas, anticipated as the final remedies for OU1 and OU2.

4. Reduction of Toxicity, Mobility, or Volume through Treatment

Neither Alternative VI-2 nor Alternative VI-3 would use treatment to reduce the toxicity, mobility or volume of the contamination in the groundwater plume(s).

5. Short-Term Effectiveness

The SSD systems under Alternatives VI-2 and VI-3 typically could be installed in most properties in less than one day and would have only a slight short-term impact. Risks to workers and the public would be minimal.

In order to implement Alternative VI-3 basements would have to be cleared of stored materials to allow access to apply the barrier material. Risks to workers and the public would be minimal, although there may be some short-term odors from the application of the barrier material, some of which are specialty paints.

6. Implementability

Administratively, Alternatives VI-2 and VI-3 are proven, readily implementable, and have been used successfully at other environmental cleanup projects. Qualified contractors with experience are available locally to perform the work. Some barrier products are proprietary and may require application by a manufacturer-approved contractor.

Both alternatives would be administratively feasible. Alternative VI-3 is more intrusive and time-consuming, requiring residents to clear their slab and basement areas to allow for application of the barriers. The most significant administrative challenge would likely be getting cooperation and access from residents, whose SSD systems would require long-term O&M commitments. VI-3 provides a physical barrier that would provide protection even if O&M proved difficult to implement. However, the physical barrier also requires O&M to assure effectiveness, and the installation and upkeep of the barriers would be more intrusive because the basements would have to be cleared for inspection and upkeep.

7. Cost

The estimated present-worth cost for Alternative VI-2 is $800,000; and $1.7 million for Alternative VI-3.

8. State/Support Agency Acceptance

The State of Indiana concurs with the selected interim action identified for OU-1 Vapor Intrusion (Alternative VI-2) in this ROD.

9. Community Acceptance

During the public meeting EPA did not receive comments opposing the preferred Alternative VI-2. EPA received one comment asking EPA to explain its rationale for the selection of the preferred Alternative VI-2 over Alternative VI-3. EPA has provided its rationale in this ROD and in the Responsiveness Summary (Appendix C).

2.11 Principal Threat Waste

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable (40 CFR §300.430(a)(1)(iii)(A)). The "principal threat" concept is applied to the characterization of "source materials" at a Superfund site. A source material is material that includes or contains hazardous substances, pollutants or contaminants that act as a reservoir for migration of contamination to groundwater, surface water or air, or acts as a source for direct exposure. Contaminated groundwater and soil vapor generally are not considered to be source materials. The preferred interim alternatives would reduce exposure to COCs in groundwater and indoor vapors but would not treat the source materials constituting principal threats; therefore, would not satisfy the statutory preference for treatment. After the implementation of the selected interim alternatives, continued RI/FS work will be conducted to address the Site source areas and the overall groundwater plume.

2.12 Selected Interim Remedy

Summary of the Rationale for the Selected Interim Remedy

The selected interim alternative for cleaning-up the Site is Alternative GW-3 for groundwater contamination and Alternative VI-2 for the vapor intrusion mitigation. Based on the information available at this time, EPA and the State of Indiana believe that the selected Alternatives will be protective of human health and the environment, cost effective, highly effective in the short-term, technically/administratively implementable, and comply with ARARs.

Alternative GW-3 will be long-term effective and permanent. It will provide a safe municipal water supply to all impacted areas of the Site not already served by municipal water. Very limited O&M will be required, and after initial implementation, further coordination with residents will not be required.

Alternative VI-2 will be effective in the long-term, although its effectiveness depends on the cooperation and participation of residents in operating and maintaining the individual SSD systems. It is preferred over VI-3, because the relatively minimal additional protectiveness added by Alternative VI-3 is outweighed by its greater intrusiveness on the residents and its significantly higher cost. The preferred interim alternatives will reduce exposure to COCs but will not treat the source materials constituting principal threats; therefore, do not satisfy the statutory preference for treatment.

Description of Selected Interim Remedy and Performance Standards

The selected interim action consists of the following:

1. Alternate Water Supply. Alternate water supply will include connecting all currently occupied properties within the proposed interim groundwater remedial area, not already connected to the City of Elkhart municipal water supply, to the municipal water supply system. An estimated 72 properties will be connected to the City of Elkhart municipal water supply. This will involve the extension of water mains and service connections where needed. Following completion of the connections, existing potable water wells will be abandoned, in accordance with state and local requirements, to prevent future use. The interim groundwater remedial area includes all properties currently occupied and not connected to a municipal water supply, located within the plume area with an approximate 500 foot buffer from Lusher Site plumes or potentially down-gradient of the plume (Please refer to Figure 3). Groundwater contamination within the Gemeinhardt plume is not part of the Lusher Site, and therefore not part of the interim remedial action. The small plume east of the Gemeinhardt plume is part of the Lusher Site plume. The buffer zone will assure protectiveness and accommodate some of the uncertainties associated with the Lusher Street plume delineation. The uncertainties of the plume delineation derive from the non-homogeneous nature of the Site geology and groundwater variations. This area has a mixture of sands and gravels with intermittent silts and clays and that affects groundwater/contaminant flow directions in and down-gradient of the plume.

Two portions within the overall Site boundary (shown in Figure 3) are excluded from the interim groundwater remedial action. Contamination has not been detected on northeast portion of the Site which is located cross- or up-gradient from the plume. The southeast portion of the Site is located up-gradient of the Site plume is therefore not impacted by Site contamination.

Figure 3 shows properties without a water account and the areas where municipal water is not currently provided. It is estimated that 72 properties (see Figure 3) with buildings are not currently connected to municipal water. The number of properties with buildings requiring connection to municipal water is based on (1) geographic information system data obtained from Elkhart County and (2) a list of addresses with water accounts obtained from the City of Elkhart Public Works Department. The actual number may vary as buildings are condemned, demolished, abandoned, or constructed in the relevant areas; and will be verified during the remedial design and construction phases.

2. Vapor Intrusion Mitigation. Vapor intrusion mitigation will be implemented at buildings which overlie the portion of the Site-related groundwater contamination plume, where EPA has determined based on multiple lines of evidence that the actual or potential migration of Site-related contaminants from contaminated groundwater to indoor air results in excess cancer risk of greater than 1E-5, or a hazard index of greater than 1 (based on target organ effects).

Multiple lines of evidence, including shallow groundwater data, sub-slab soil vapor data, and indoor air data, have been collected. EPA has determined that all buildings in the VI area of concern will be remediated with sub-slab depressurization (SSD) (residential) or other appropriate vapor mitigation (eg.,ventilation systems at commercial/industrial property). This is estimated to be approximately 200 buildings. Only a subset of homes in the VI area of concern

were sampled. It was determined that vapor mitigation is appropriate at about 45% of tested properties; about 38% of tested properties would require re-sampling; and about 17% of tested properties had VI concentrations that indicated no cleanup action is necessary. The selected remedy will provide for vapor mitigation at all buildings in the VI area of concern because it is more cost-effective to do so than to continually re-sample, and as necessary, re-mobilize to mitigate, properties without vapor mitigation systems.

Dependent upon the construction type and layout of individual buildings, EPA may use a variety of vapor intrusion mitigation techniques, including sub-slab depressurization (radon-type system), passive sub-slab venting, and crawl space depressurization to prevent Site-related contaminants in vapor form from migrating from the subsurface into indoor air at concentrations which pose an unacceptable risk to human health. The specific mitigation systems to be implemented at each residence will be determined during the Remedial Design.

The estimated cost of the remedy includes the costs to install and maintain the vapor intrusion mitigation systems. EPA expects property owners to pay for the electricity necessary to operate the vapor intrusion mitigation system, estimated to range between $5 and $15 per month per residence. Operating costs are similar to cost for radon mitigation systems.

3. Operation and Maintenance (O&M). Properly installed water supplies have long life spans and are expected to last for decades, with essentially no O&M. O&M of the vapor intrusion mitigation systems will continue until the entire RI/FS investigation is completed and the final remedies selected for OU-1 and OU-2 are implemented, and the cumulative risk presented by all remaining Site-related compounds is below a $1E^{-5}$ cancer risk level, and the non-cancer hazard index (HI) is less than or equal to 1 (based on target organ effects). EPA expects to consult with the Indiana Department of Environmental Management (IDEM), the support agency for this action, regarding this determination.

4. Institutional Controls (ICs). EPA expects that in the future additional occupied buildings may be constructed over the groundwater contamination plume. Builders will be required to equip future buildings with vapor intrusion mitigation systems, as necessary. An institutional control such as a local ordinance will establish this requirement. In addition, an institutional controls such as a local ordinance is required to prevent potable use of untreated groundwater. Newly constructed buildings will be required to connect to municipal water (if available) or have filters installed and maintained. The ICs will also require the notification to construction and utility workers of the presence of potentially contaminated groundwater so that they can take appropriate precautions. Because contamination will be left in place, five-year reviews are required. The ICs should remain in place until the source(s) are controlled and the groundwater achieves potable standards.

Summary of the Estimated Remedy Costs

Alternative GW-3 has an estimated present-worth cost (rounded to the nearest $1,000) of $1,961,000, which includes $1,841,000 in capital costs and $120,000 present-worth O&M costs. O&M costs are estimated to be $5,450 per year for 30 years with an additional $24,000 every five years for the five-year reviews.

The estimated present-worth cost for Alternative VI-2 is $791,000, which includes $463,000 in capital costs and $328,000 in present-worth O&M costs over a 30 year period. Annual costs are estimated at $22,000 for 30 years, with an additional $24,000 every five years for the five-year review. If the timeframe for operation of the vapor mitigation systems is reduced to 10 years, the present-worth cost of the remedy is reduced to $669,000.

The information in this cost estimate summary table is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. Major changes may be documented in the form of a memorandum in the Administrative Record file, an ESD, or a ROD amendment. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost.

Expected Outcome of the Selected Interim Remedy

When the selected interim remedy is implemented potential and current human exposures to Site contaminants in potable water and indoor vapors will be mitigated.

2.13 Statutory Determinations

Under CERCLA Section 121 and the NCP, the lead agency must select remedies that are protective of human health and the environment, comply with ARARs (unless a waiver is justified), are cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous substances as a principal element and a bias against off-site disposal of untreated wastes. The following sections discuss how the selected interim action meets these statutory requirements.

Protection of Human Health and the Environment

The selected interim action requires providing alternate water supply to buildings at the Site identified in this ROD, directly or potentially at risk for delivering contaminated groundwater to human receptors. This interim action will be protective of human health and the environment during implementation and after completion. In addition, the interim action selected by this ROD will require installing vapor intrusion mitigation systems at residences where EPA has determined that vapor intrusion of Site-related contaminants to indoor air poses an unacceptable risk to human health. The vapor intrusion mitigation systems will prevent Site-related contaminants in vapor form from migrating from the subsurface into indoor air at concentrations which represent a threat to human health.

Compliance with Applicable or Relevant and Appropriate Requirements

This interim action is limited in scope and is based on a risk-based standard calculated by the HHRA. This criterion assesses how an alternative complies with federal and more stringent state regulatory applicable or relevant and appropriate requirements, known as ARARs. Only state

requirements that are more stringent than federal requirements are ARARs. The potential ARARs include chemical-, action-, and location-specific ARARs, as summarized in Table 11 (attached). Alternatives GW-3 and VI-2 meet ARARs appropriate to this interim action.

Cost Effectiveness

The selected interim action is cost-effective because it represents a reasonable value for the money to be spent. The NCP requires that "a remedy shall be cost-effective if its costs are proportional to its overall effectiveness." (See the NCP at 40 C.F.R. §300.430(f)(1)(ii)(D)). In evaluating cost-effectiveness, EPA evaluated the overall effectiveness of the alternative that satisfied the threshold criteria (protection of human health and the environment and ARAR-compliant) by assessing three of the five balancing criteria (long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness). Overall effectiveness was then compared to costs to determine cost effectiveness. The relationship of the overall effectiveness of these remedial alternatives was determined to be proportional to its cost and hence these alternatives represents a reasonable value for the money to be spent.

The estimated cost to implement the selected interim actions is $2.8 M.

Utilization of Permanent Solutions and Alternative Treatment Technologies (or Resource Recovery Technologies) to the Maximum Extent Practicable

These interim actions are not designed or intended to be a final remedial action at the Site. The municipal water supply remedial action is a permanent solution to address exposures to contaminated groundwater, however, provides no treatment of hazardous substances, and is not a permanent solution to the groundwater contamination. The vapor mitigation remedial action is an interim solution to the exposures to site-related indoor vapor intrusion and does not treat the hazardous substances to reduce mobility, toxicity, or volume. There is no cost-effective, practicable treatment technology to address soil gas vapors that migrate into buildings, given the circumstances of this Site. EPA expects the final action to be a permanent solution and to reduce toxicity, mobility, or volume of hazardous substances through treatment to the maximum extent practicable.

Preference for Treatment as a Principal Element

This interim remedy does not satisfy the statutory preference for treatment as a principal element of the remedy. The potential need to treat contaminated soil vapor prior to discharge to the outdoor atmosphere in order to ensure protection of human health and the environment will be evaluated during the Remedial Design phase, however, it is not expected to be necessary. EPA will evaluate the statutory preference to reduce toxicity, mobility, or volume of hazardous substances through treatment at time of selection of the final remedy.

Five-Year Review Requirements

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on-Site above levels that allow for unlimited use and unrestricted exposure, a statutory review

will be conducted within five years after initiation of remedial action to ensure that the remedy is protective of human health and the environment.

2.14 Documentation of Significant Changes

The Proposed Remedial Action Plan (PRAP) for the interim OU-1 remedy at the Site was released for public comment on April 21, 2014. The PRAP identified the Preferred Alternative of providing connection to municipal water mains to address exposures to contaminated groundwater and vapor intrusion mitigation to address buildings where vapor intrusion of Site-related contaminants to indoor air poses an unacceptable risk to human health. Although no written comments were received by the EPA, all verbal comments submitted during the public comment period were evaluated. It was determined that no significant changes to the remedy proposed in the PRAP were necessary or appropriate.

3.0 Responsiveness Summary

This Responsiveness Summary documents public participation in the remedy selection process for the Lusher Site. Comments received during the April 29 public meeting and EPA's response to these comments are included in the Responsiveness Summary, as Appendix C of this Record of Decision. The public comment period for this response action ran from April 21, 2014 to May 22, 2014.

3.1 Stakeholder Comments and Lead Agency Responses

Verbal comments were received during the April 29, 2014, Public Meeting at the Calvary United Methodist Church, 2222 West Indiana Avenue, Elkhart, Indiana, 46516. Two persons provided brief comments inquiring about the VI interim remedy. Neither commenter expressed opposition to EPA's proposed interim remedy.

3.2 Technical and Legal Comments

No technical and legal comments on the OU1 PRAP were received.

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TABLES

Table 1
Summary of Private Well, VAS, Monitoring Well, and Water Table Samples of COCs

Analyte Name	Screening Levels		Detection Frequency and Maximum Result							
			Residential Well Samples		VAS Samples		Monitoring Well Samples		Water Table Samples	
	Groundwater RSL - Tapwater[1] (µg/L)	Groundwater MCL (µg/L)	Detection Frequency	Maximum Result (µg/L)	Detection Frequency	Maximum Result (µg/L)	Detection Frequency	Maximum Result (µg/L)	Detection Frequency	Maximum Result (µg/L)
Trichloroethene	0.44	5	7 of 54, 13%	25	30 of 135, 22%	56	41 of 93, 44%	370	24 of 53, 45%	53

Notes:
Blank cells have no values.
µg/L = Microgram per liter
COI = Constituent of interest
1 RSLs are from the Spring 2012 update.
MCL = Maximum Contaminant Level
NT = Not tested
RSL = Regional Screening Level
TTHM = Total trihalomethanes
VAS = Vertical Aquifer Sampling

Table 2
Summary of Soil Vapor, Sub Slab, and Indoor Air Results for COCs

Analyte Name	Soil Vapor and SS Screening Level ($\mu g/m^3$)	IA RSL[1] ($\mu g/m^3$)		Detection Frequency and Maximum Result					
				Soil Vapor Samples		SS Samples		IA Samples	
				Detection Frequency	Maximum Result ($\mu g/m^3$)	Detection Frequency	Maximum Result ($\mu g/m^3$)	Detection Frequency	Maximum Result ($\mu g/m^3$)
1,1-Dichloroethane	15	1.5	Summer	8 of 28, 29%	3,100	9 of 27, 33%	330	4 of 18, 22%	2
			Winter			12 of 32, 38%	740	4 of 32, 12%	2.8
Chloroform	1.1	0.11	Summer	21 of 28, 75%	120	23 of 27, 85%	51	15 of 18, 83%	14
			Winter			22 of 32, 69%	43	13 of 32, 41%	2.2
Tetrachloroethene	94	9.4	Summer	20 of 28, 71%	140	26 of 27, 96%	370	7 of 18, 39%	45
			Winter			22 of 32, 69%	490	3 of 32, 9%	48
Trichloroethene	4.3	0.43	Summer	21 of 28, 75%	7,400	23 of 27, 85%	5,200	10 of 18, 56%	7.1
			Winter			31 of 32, 97%	3,900	20 of 32, 62%	12

Notes:
Blank cells have no values.

$\mu g/m^3$ = Microgram per cubic meter
COI = Constituent of interest
SS = Sub-slab
1 RSLs are from the Spring 2012 update.
IA = Indoor air
NC = Not Calculated
NT = Not tested
RSL = Regional Screening Level

Table 11 – Potentially Applicable or Relevant and Appropriate Requirements

Potential ARAR	Description	ARAR Type	Potentially Applicable or Relevant and Appropriate	Comment
SAFE DRINKING WATER ACT OF 1974				
40 CFR Parts 141.60 – 141.63 and 141.50 – 141.52	The National Primary Drinking Water Regulations establish MCLs and MCLGs for several common organic and inorganic contaminants for public drinking water systems. MCLs specify the maximum permissible concentrations of contaminants in public drinking water supplies. MCLs are federally enforceable standards based in part on the availability and cost of treatment techniques. MCLGs specify the maximum concentrations at which no known or anticipated adverse effect on humans will occur. MCLGs are non-enforceable, health-based goals set equal to or lower than MCLs.	Chemical-specific	Relevant and appropriate	These regulations apply to all public water supplies (having more than 15 connections or serving more than 25 persons regularly). The MCLs are the ARARs for the Site because the aquifer currently is used for drinking water at residences not hooked up to the alternate water supply during previous Site investigations. Currently, nothing prohibits the use of groundwater at the Site as a public water supply (for example, supplying an apartment building with 25 or more residents) or in a small water supply system.
FLOODPLAIN MANAGEMENT EXECUTIVE ORDER 11988				
40 CFR Part 6, Appendix A	This order requires federal agencies to evaluate potential adverse effects associated with direct and indirect development of a floodplain. Alternatives that involve modification or construction within a floodplain may not be selected unless a determination is made that no practicable alternative exists. If no practicable alternative exists, potential harm must be minimized and action taken to restore and preserve the natural and beneficial values of the floodplain.	Location-specific	Potentially Applicable	This order is applicable to construction activities in the St. Joseph River floodplain.

Table 11 – Potentially Applicable or Relevant and Appropriate Requirements (continued)

Potential ARAR	Description	ARAR Type	Potentially Applicable or Relevant and Appropriate	Comment
CLEAN WATER ACT OF 1977				
Protection of Wetlands, Executive Order 11990 (40 CFR Part 6, Appendix A)	Under this order, federal agencies are required to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance natural and beneficial values of wetlands. If remediation is required within wetland areas and no practical alternative exists, potential harm must be minimized and action taken to restore natural and beneficial values of the wetland areas.	Location-specific	Potentially applicable	This order may be applicable or relevant and appropriate depending on the location of wetlands, if any, along the St. Joseph River. No wetlands currently are known to exist along the northern Site boundary or the St. Joseph River.
NPDES, 33 USC, §§ 1251-1387, Clean Water Act NPDES Permit Program (40 CFR 122)	Under this program, discharges of pollutants to waters of the United States are regulated.	Action-specific and possibly chemical-specific	Potentially applicable	Applicability depends on the remedial action chosen. Program requirements apply to extracted groundwater discharged to waters of the U.S.
Federal Water Pollution Control Act, Section 401: Water Quality Certification	This requirement establishes a permit program to regulate discharge into waters of the United States, including wetlands.	Chemical-specific	Potentially applicable	Applicability depends on the remedial action chosen.

Table 11 – Potentially Applicable or Relevant and Appropriate Requirements

Potential ARAR	Description	ARAR Type	Potentially Applicable or Relevant and Appropriate	Comment
FISH AND WILDLIFE COORDINATION ACT				
16 USC, §§ 661 et seq. 16 USC § 742a 16 USC § 2901 40 CFR 6.302 50 CFR 402	Actions that affect species or habitat require consultation with the U.S. Department of the Interior, U.S. Fish and Wildlife Service, National Marine Fisheries Service, and state agencies as appropriate to ensure that the proposed actions do not jeopardize the continued existence of the species or adversely modify or destroy critical habitat. The effects of water-related projects on fish and wildlife resources must be considered. Action must be taken to prevent, mitigate, or compensate for project-related damages or losses to fish and wildlife resources. Consultation with the responsible agency also is strongly recommended for on-site actions. Under 40 CFR Part 300.38, these requirements apply to all response activities under the NCP.	Location-specific	Potentially applicable	Applicability will be further assessed during the FFS.
RESOURCE CONSERVATION AND RECOVERY ACT OF 1976 (RCRA)				
40 CFR 260 - 268	This act includes regulations and requirements for generators, transporters, or owners or operators of treatment, storage, or disposal facilities that use hazardous waste materials.	Chemical-specific	Potentially applicable	Applicability depends on the remedial action chosen. Regulations apply to on-site activities related to the disposal of investigation-derived wastes and to remedies that generate waste, such as excavation performed to install a remedial system.
ENDANGERED SPECIES ACT				
16 USC § 1531 50 CFR 200	This act requires federal agencies to ensure that any action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of any threatened or endangered species or adversely modify critical habitat.	Location-specific	Potentially applicable	No endangered species that would be affected by remedial actions are known to be present at the Site.

Table 11 – Potentially Applicable or Relevant and Appropriate Requirements (continued)

Potential ARAR	Description	ARAR Type	Potentially Applicable or Relevant and Appropriate	Comment
NATURAL HISTORIC PRESERVATION ACT				
16 USC §§ 661 et seq. 36 CFR Part 65	This act establishes procedures to provide for preservation of scientific, historical, and archaeological data that could be destroyed through alteration of terrain as a result of a federal construction project or a federally licensed activity or program. If scientific, historical, or archaeological artifacts are discovered at the Site, work in the area of the Site affected by such discovery will be halted pending completion of any data recovery and preservation activities required pursuant to the Act and any implementing regulations.	Location-specific	Potentially applicable	No part of the Site is listed on the National Register of Historic Places. This Act is potentially applicable during remedial activities if scientific, historic, or archaeological artifacts are identified during implementation of the remedy.
U.S. DEPARTMENT OF TRANSPORTATION				
Requirements for the Transport of Hazardous Materials (40 CFR 172)	Transportation of hazardous materials on public roadways must comply with these requirements.	Action-specific	Potentially applicable	If hazardous materials are transported on or off the Site as part of a remedial action, these regulations apply.
OTHER FEDERAL GUIDELINES TO BE CONSIDERED				
IRIS (EPA 2012)	Risk reference doses are estimates of daily exposure levels unlikely to cause significant adverse non-cancer health effects over a lifetime. Cancer slope factors are used to compute the incremental cancer risk from exposure to Site contaminants and represent the most up-to-date information on cancer risk from EPA's Carcinogen Assessment Group.	Chemical - specific	To be considered	Applicability or relevance and appropriateness will be further assessed and may be used in establishing RALs in the proposed plan and/or ROD.

Table 11 – Potentially Applicable or Relevant and Appropriate Requirements

Potential ARAR	Description	ARAR Type	Potentially Applicable or Relevant and Appropriate	Comment
EPA RSLs	EPA RSLs and associated guidance necessary to calculate them are risk-based tools for evaluating and cleaning up contaminated sites. The RSLs represent agency guidelines and are not legally enforceable standards.	Chemical-specific	To be considered	Applicability or relevance and appropriateness will be further assessed during the FS.
Clean Air Act	Fugitive emissions from construction sites.			
Underground Injection Control (40 CFR 144-147)	These regulations protect groundwater sources of drinking water by imposing restrictions on underground injections.	Action-specific	Potentially applicable	Groundwater remedial action may require injections, depending on the remedial action chosen.
INDIANA ADMINISTRATIVE CODE (IAC)				
Indiana Drinking Water Standards (327 IAC 2-11 and 8)	These rules establish MCLs in accordance with the Safe Drinking Water Act (40 CFR 141.11) as well as groundwater classification methods and associated standards.	Chemical-specific	Applicable	These regulations apply to all public water supplies (having more than 15 connections or serving more than 25 persons regularly). The MCLs are the ARARs for the Site because the aquifer currently is used for drinking water at residences not hooked up to the alternate water supply during previous Site investigations. Currently, nothing prohibits the use of groundwater at the Site as a public water supply (for example, supplying an apartment building with 25 or more residents) or in a small water supply system.
Regulation of Water Well Drilling (IC 25-39-4 and 312 IAC 13)	This regulation outlines requirements for construction and abandonment of groundwater wells for non-personal use in Indiana.	Action-specific	Potentially Applicable	Installation and abandonment of water wells (such as extraction and monitoring wells) may be required, depending on the remedial action chosen.

Table 11 – Potentially Applicable or Relevant and Appropriate Requirements (continued)

Potential ARAR	Description	ARAR Type	Potentially Applicable or Relevant and Appropriate	Comment
Indiana Solid Waste Rules (IAC Title 329)	These rules apply to remedies that involve off-site disposal of materials typically involved with excavations. Contaminated soil and waste excavated for off-site disposal must be tested for hazardous waste characteristics, and if the soil or waste is found to be hazardous waste, the rule requirements apply.	Action-specific	Potentially applicable	Applicability depends on the remedial action chosen. Regulations apply to on-site activities related to the disposal of investigation-derived wastes and to remedies that generate waste, such as excavation performed to install a remedial system.
Indiana Air Pollution Control Regulations (IAC Title 326)	This law applies to the regulation of air emissions for activities that could create dust (such as excavation).	Action-specific	Potentially relevant and appropriate	Relevancy and appropriateness depend on the remedial action chosen.
RISC	RISC is IDEM's method for developing remediation objectives (risk-based and site-specific) for contaminated soil and groundwater. These remediation objectives protect human health and take into account Site conditions and land use. The RISC document is a non-rule policy.	Chemical-specific	To be considered	The RISC document provides a methodology for establishing remedial goals and determining that remediation has been achieved. The RISC policy does not apply to Superfund sites but does apply to remedial sites under several state programs, including the state version of RCRA, the state Leaking Underground Storage Tank program, the State Cleanup Program (state equivalent of the federal Superfund Program), and the Voluntary Remediation Program.

Table 11 – Potentially Applicable or Relevant and Appropriate Requirements (continued)

Potential ARAR	Description	ARAR Type	Potentially Applicable or Relevant and Appropriate	Comment
Voluntary Remediation of Hazardous Substances and Petroleum (IC 13-25-5)	IC 13-25-5 established the Voluntary Remediation Program in 1993 and gave the IDEM the authority to establish guidelines for voluntary site closure. Under this authority, IDEM developed the RISC non-rule policy document to guide site closures within the authority of IDEM's remediation programs. The RISC guidance document does not have the effect of law.	Chemical-specific	To be considered	The RISC document provides a methodology for establishing remedial goals and determining that remediation has been achieved. The RISC policy does not apply to Superfund sites but does apply to remedial sites under several state programs, including the state version of RCRA, the state Leaking Underground Storage Tank program, the State Cleanup Program (state equivalent of the federal Superfund Program), and the Voluntary Remediation Program.
Indiana Regulations for Establishing Emissions Levels for VOCs (326 IAC 2,8, and 20)	326 IAC establishes permitting requirements for emissions of VOCs and requires Best Available Control Technology for new sources with potential emissions exceeding a specified threshold value.	Action-specific	Potentially applicable	Applicability of substantive requirements depends on the remedial action chosen. Regulations apply to remedies involving the discharge of VOCs.
Indiana Regulations for Permitting of Air Strippers (326 IAC 2 and 8)	326 IAC establishes permitting requirements for emissions of VOCs and requires Best Available Control Technology for new sources with potential emissions exceeding a specified threshold value.	Action-specific	Potentially applicable	Applicability of substantive requirements depends on the remedial action chosen. Regulations apply to remedies involving the use of air strippers to remove VOCs from groundwater.

Table 11 – Potentially Applicable or Relevant and Appropriate Requirements (continued)

Potential ARAR	Description	ARAR Type	Potentially Applicable or Relevant and Appropriate	Comment
Indiana Regulations for Construction Permits for Water Treatment Facilities (327 IAC 3)	The regulations control the issuance of permits for the construction of water pollution treatment or control facilities.	Action-specific	Potentially applicable	Applicability of substantive requirements depends on the remedial action chosen.
Indiana NPDES Permit Regulations (327 IAC 5 and 327 IAC 2)	These regulations apply to NPDES discharges and applicable permits. The regulations represent Indiana's implementation of the federal NPDES permit program.	Action-specific	Potentially applicable	Applicability of substantive requirements depends on the remedial action chosen. Regulations apply to remedies involving discharge to waters of the State, such as the St. Joseph River.
Indiana Wellhead Protection Program (327 IAC 8-4.1)	This rule establishes MCLs (40 CFR 141 and 327 IAC 8) as cleanup standards for impacted groundwater within established wellhead protection areas.	Location-specific	To be considered	The Site is not located within a wellhead protection area, but locations of wellhead protection areas will be considered during the remedial design.
Water Quality Standards (327 IAC 2)	These standards are for surface water quality in Indiana.	Chemical-specific	Potentially applicable	Applicability depends on the remedial action chosen. Program requirements apply to extracted groundwater discharged to waters of the U.S.
Groundwater Quality Standards (327 IAC 2-11)	These standards are for groundwater quality in Indiana and provide a groundwater classification plan.	Chemical-specific	Potentially applicable	Applicability will be further assessed during the FS.

Table 11 – Potentially Applicable or Relevant and Appropriate Requirements (continued)

Potential ARAR	Description	ARAR Type	Potentially Applicable or Relevant and Appropriate	Comment
ELKHART COUNTY AND CITY OF ELKHART				
Elkhart County Groundwater Protection Ordinance No. 09-172	The purpose of this ordinance is to enhance and preserve the public health, safety, and welfare of persons and property in Elkhart County by protecting the groundwater of Elkhart County from degradation resulting from the spills of toxic or hazardous substances. The ordinance applies to facilities that use, store, or generate toxic or hazardous substances, including construction sites where petroleum products (such as fuel) are stored.	Location-specific	Potentially applicable	Use or storage of hazardous materials may be required, depending on the remedial action chosen and the means and methods of construction of the selected remedy..
City of Elkhart Drilling Permits	The City of Elkhart requires that all excavations along city rights-of-way be permitted.	Action-specific	Potentially applicable	The substantive requirements are potentially applicable, depending on the remedy selected, and apply to remedies involving excavation in the City of Elkhart.
City of Elkhart Standard Construction Specifications	This requirement provides standard specifications for public works construction within the City of Elkhart. These include the local requirements for the design and construction of water mains and service connections.	Action-specific	Potentially applicable	The specifications are potentially applicable depending on the remedy selected and apply to the construction of utilities, such as water mains, turned over to the City of Elkhart.
City of Elkhart Wastewater Utility Use Ordinance and Wastewater Utility Policies	The ordinance provides criteria for industrial users of the City of Elkhart sewer system and publicly owned treatment works. The policy applies to all non-residential users of the City of Elkhart sewer system and POTW.	Action-specific	Potentially applicable	The substantive requirements of the ordinance and policy are potentially applicable, depending on the remedy selected, and would apply if wastewater is discharged to the City of Elkhart sewer system or POTW.

Table 11 – Potentially Applicable or Relevant and Appropriate Requirements (continued)

Notes:

§ Section
§§ Sections
ARAR Applicable or relevant and appropriate requirement
CFR *Code of Federal Regulations*
EPA U.S. Environmental Protection Agency
FFS Focused Feasibility study
IAC *Indiana Administrative Code*
IC *Indiana Code*
IDEM Indiana Department of Environmental Management
IRIS Integrated Risk Information System
MCL Maximum Contaminant Level
MCLG Maximum Contaminant Level Goal
NCP National Oil and Hazardous Substances Pollution Contingency Plan
NPDES National Pollutant Discharge Elimination System
POTW Publicly owned treatment works
RCRA Resource Conservation and Recovery Act
RISC Risk Integrated System of Closure
RSL Regional Screening Level
USC *United States Code*
VOC Volatile organic compound

Source:

EPA. 2012. "Integrated Risk Information System (IRIS)." Accessed in January 2013. On-line Address: http://cfpub.epa.gov/ncea/iris/index.cfm?fuseaction=iris.showSubstanceList

Table 12: Chart Comparing Groundwater Risk Mitigation Options with the Nine Superfund Remedy Selection Criteria

Evaluation Criterion	Alternative GW-1	Alternative GW-2	Alternative GW-3*
1. Overall Protection of Human Health and the Environment	○	●	●
2. Compliance with ARARs	○	●	●
3. Long-term Effectiveness and Permanence	○	◉	●
4. Reduction of Toxicity, Mobility, or Volume through Treatment	○	○	○
5. Short-term Effectiveness	○	●	●
6. Implementability	●	●	●
7. Cost ($ millions)	$0	$1.7	$2.0
8. State Acceptance	The State supports the preferred alternative (Alternative 3).		
9. Community Acceptance	Will be evaluated after the public comment period.		

● Fully meets criterion ◉ Partially meets criterion ○ Does not meet criterion

* EPA's preferred alternative

Table 13: Chart Comparing Interim Vapor Intrusion Risk Mitigation Options with the Nine Superfund Remedy Selection Criteria

Evaluation Criterion	Alternative VI-1	Alternative VI-2*	Alternative VI-3
1. Overall Protection of Human Health and the Environment	○	●	●
2. Compliance with ARARs	○	●	●
3. Long-term Effectiveness and Permanence	○	●	●
4. Reduction of Toxicity, Mobility, or Volume through Treatment	○	○	○
5. Short-term Effectiveness	○	●	●
6. Implementability	●	●	●
7. Cost ($ millions)	$0	$0.8	$1.7
8. State Acceptance	The State supports the preferred alternative.		
9. Community Acceptance	Will be evaluated after the public comment period.		

● Fully meets criterion ◉ Partially meets criterion ○ Does not meet criterion

* EPA's preferred alternative

FIGURES

Site boundary

Basemap source: Esri

document path: D:\projects\Lusher Street_ROD\figure 1.mxd author: aschubert

LUSHER STREET GROUNDWATER CONTAMINATION SITE
ELKHART COUNTY, INDIANA

RECORD OF DECISION

FIGURE 1

LUSHER STREET SITE LOCATION

EPA REGION 5 RAC 2 | REVISION 0 | JUNE 2014

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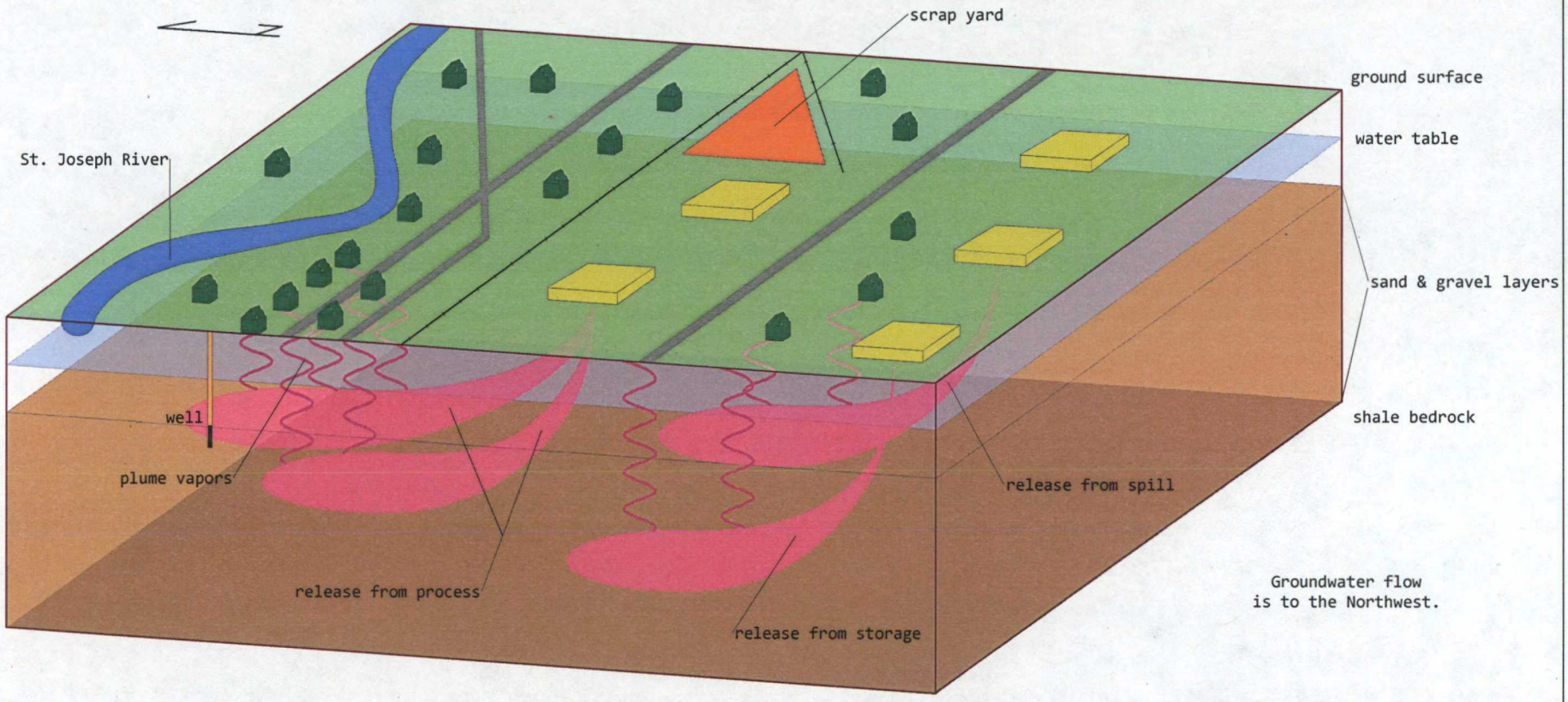

Residential area

Industrial area

LUSHER STREET GROUNDWATER CONTAMINATION SITE
ELKHART COUNTY, INDIANA

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FIGURE 2

CONCEPTUAL SITE MODEL

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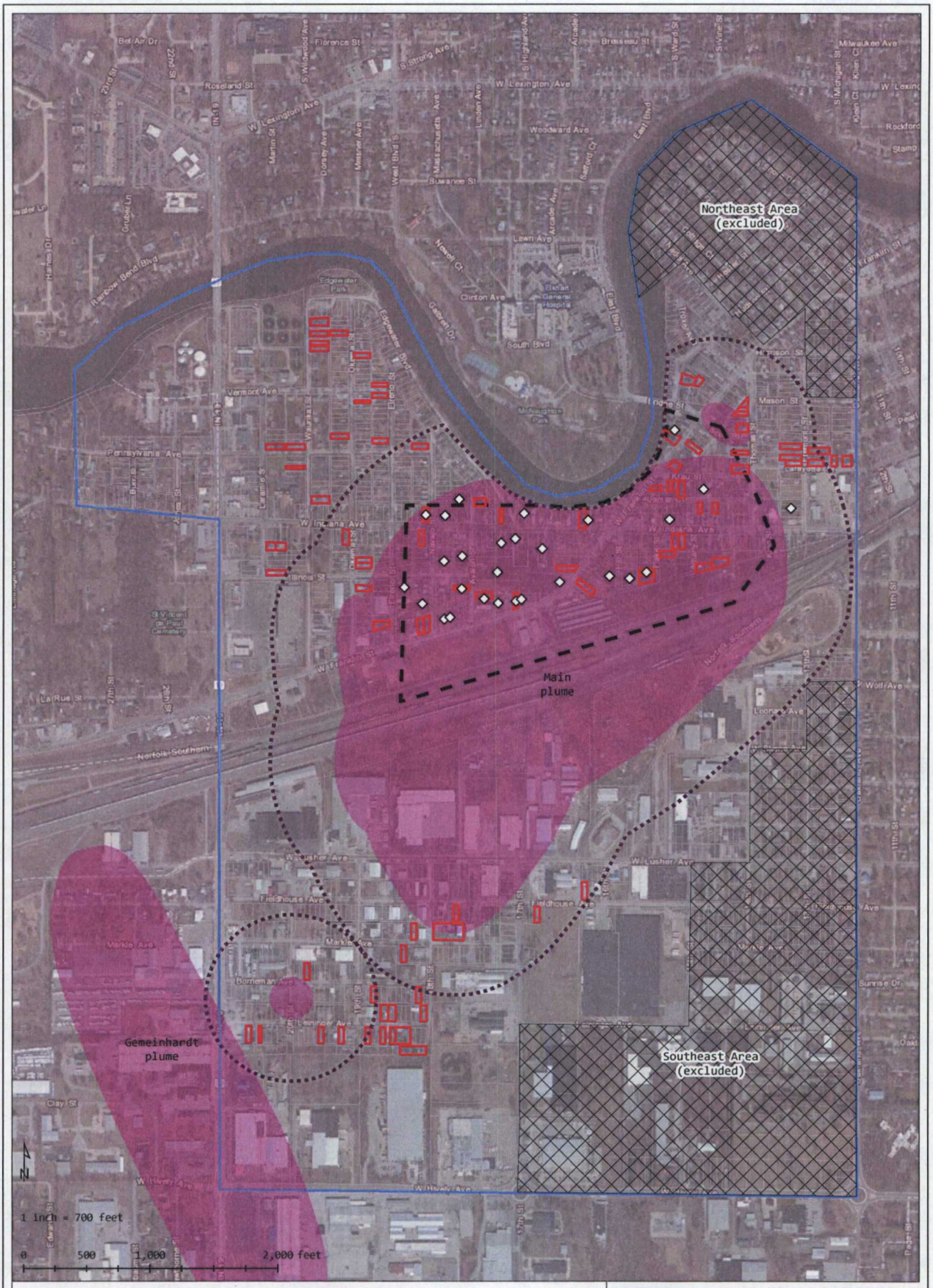

LUSHER STREET GROUNDWATER CONTAMINATION SITE
ELKHART COUNTY, INDIANA

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FIGURE 3
GROUNDWATER PLUME & PROPOSAL REMEDIAL AREAS

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Monitoring well / VAS sampling

Cross-section

Site boundary

Notes:
VAS = Vertical Aquifer Sampling

Basemap source: Esri

LUSHER STREET GROUNDWATER CONTAMINATION SITE
ELKHART COUNTY, INDIANA

RECORD OF DECISION

FIGURE 4

GEOLOGICAL CROSS SECTION PLAN VIEW MAP

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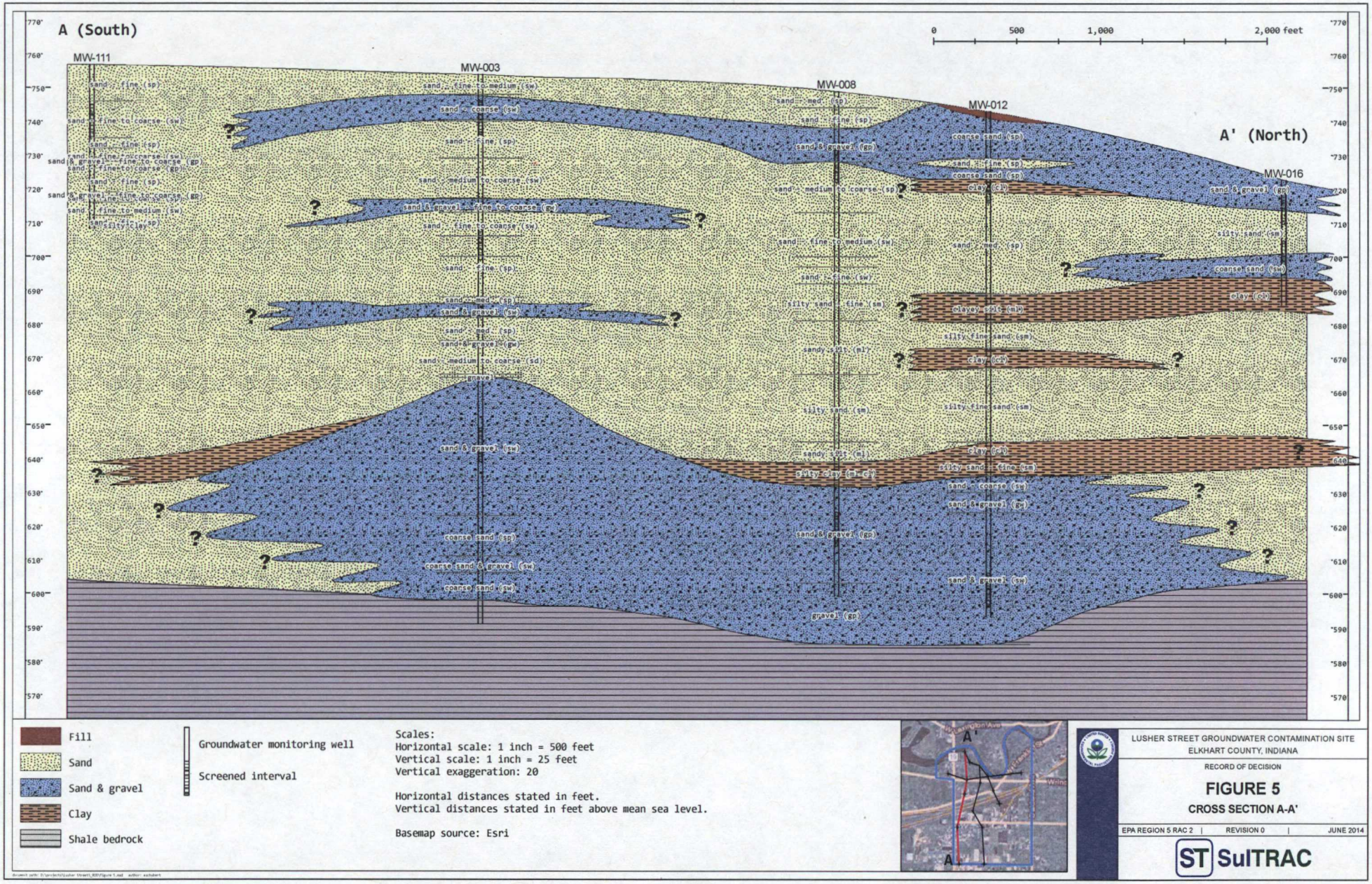

Scales:
Horizontal scale: 1 inch = 500 feet
Vertical scale: 1 inch = 25 feet
Vertical exaggeration: 20

Horizontal distances stated in feet.
Vertical distances stated in feet above mean sea level.

Basemap source: Esri

LUSHER STREET GROUNDWATER CONTAMINATION SITE
ELKHART COUNTY, INDIANA

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FIGURE 5

CROSS SECTION A-A'

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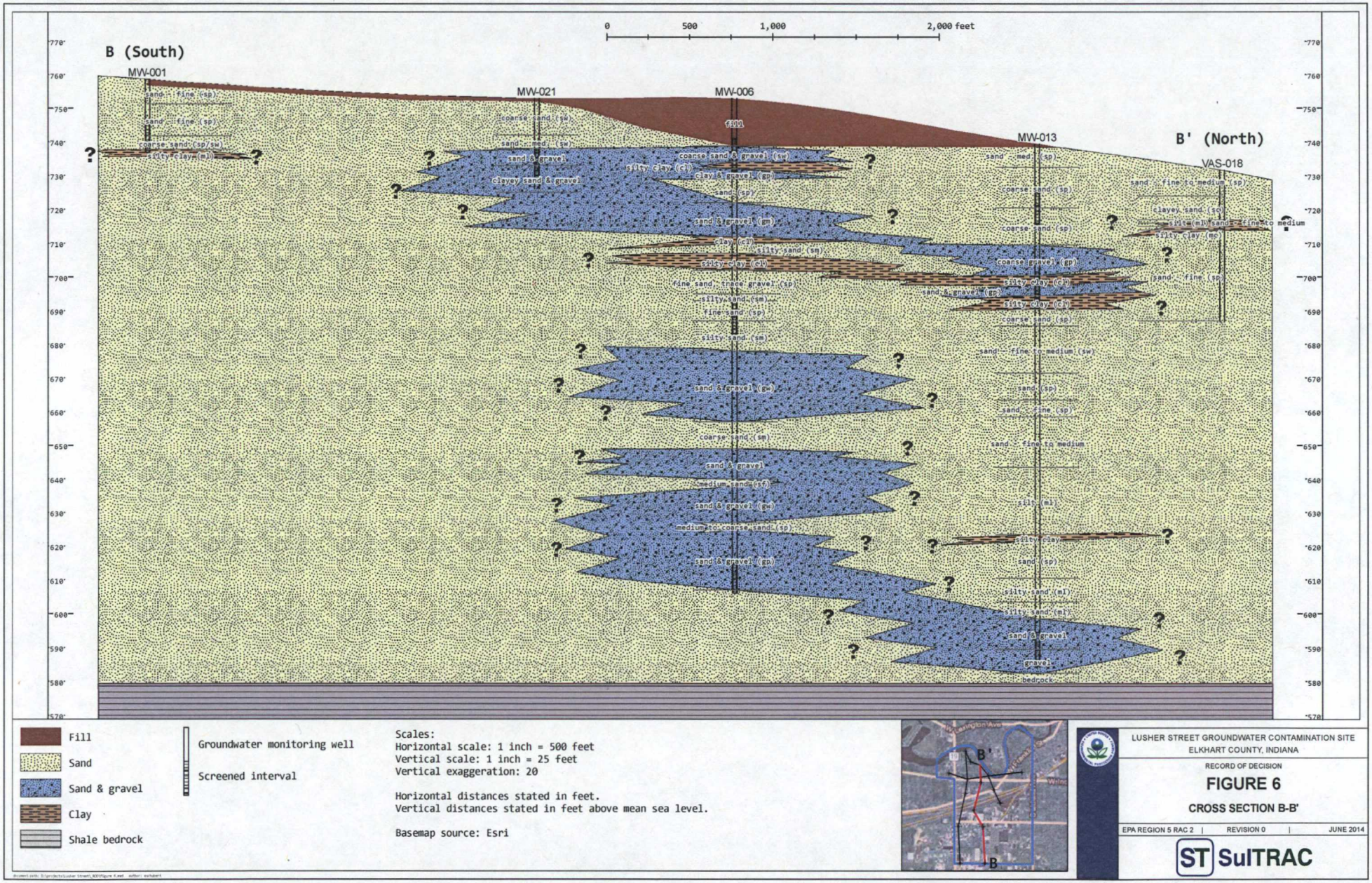

Fill
Sand
Sand & gravel
Clay
Shale bedrock

Groundwater monitoring well

Screened interval

Scales:
Horizontal scale: 1 inch = 500 feet
Vertical scale: 1 inch = 25 feet
Vertical exaggeration: 20

Horizontal distances stated in feet.
Vertical distances stated in feet above mean sea level.

Basemap source: Esri

LUSHER STREET GROUNDWATER CONTAMINATION SITE
ELKHART COUNTY, INDIANA

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FIGURE 6

CROSS SECTION B-B'

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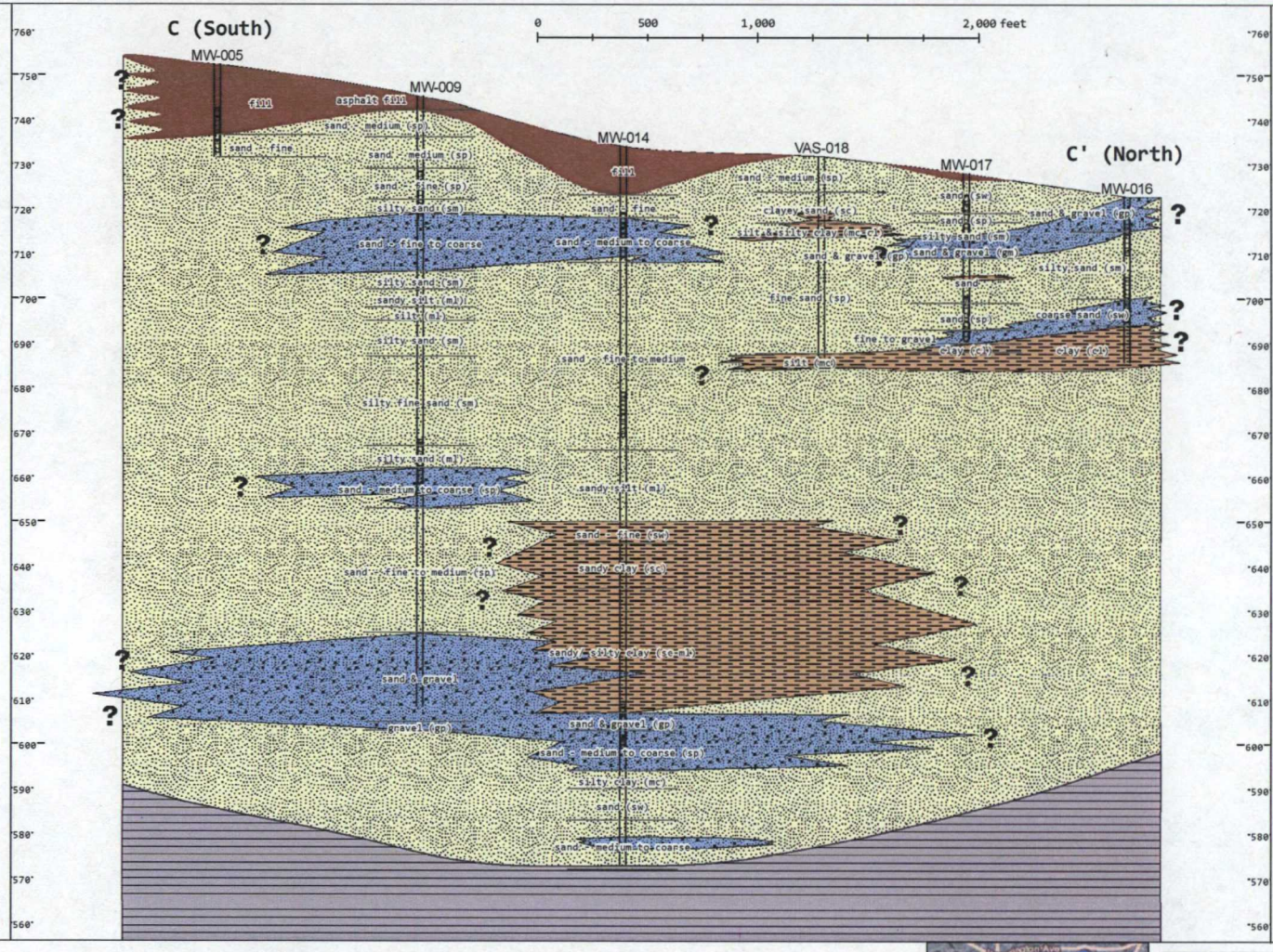

Fill
Sand
Sand & gravel
Clay
Shale bedrock

Groundwater monitoring well

Screened interval

Scales:
Horizontal scale: 1 inch = 500 feet
Vertical scale: 1 inch = 25 feet
Vertical exaggeration: 20

Horizontal distances stated in feet.
Vertical distances stated in feet above mean sea level.

Basemap source: Esri

LUSHER STREET GROUNDWATER CONTAMINATION SITE
ELKHART COUNTY, INDIANA

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FIGURE 7

CROSS SECTION C-C'

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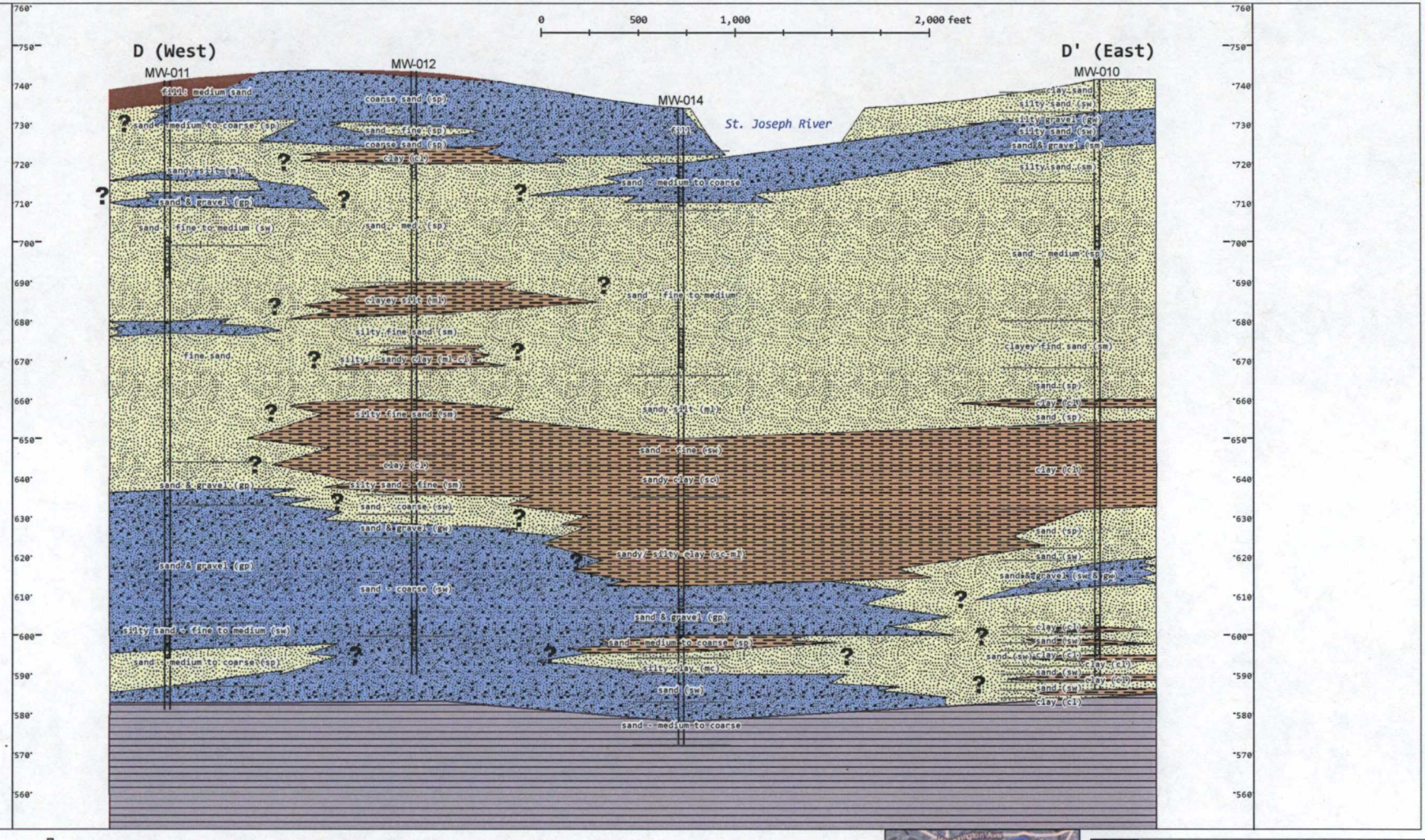


Fill
Sand
Sand & gravel
Clay
Shale bedrock

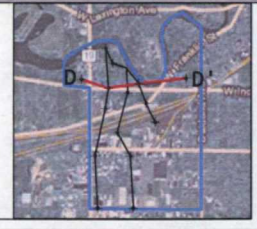
Groundwater monitoring well

Screened interval

Scales:
Horizontal scale: 1 inch = 500 feet
Vertical scale: 1 inch = 25 feet
Vertical exaggeration: 20

Horizontal distances stated in feet.
Vertical distances stated in feet above mean sea level.

Basemap source: Esri



LUSHER STREET GROUNDWATER CONTAMINATION SITE
ELKHART COUNTY, INDIANA

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FIGURE 8

CROSS SECTION D-D'

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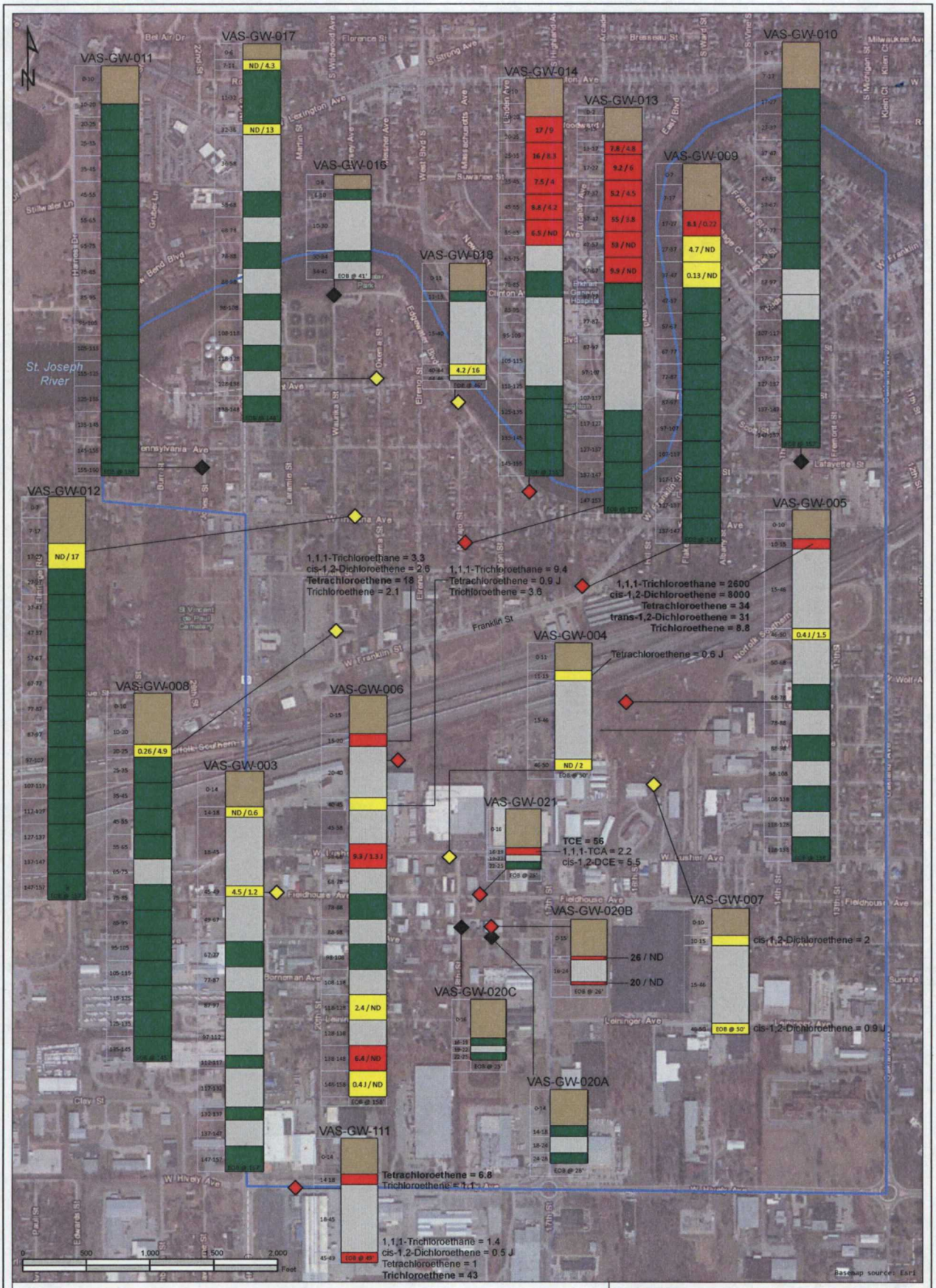

Interval depth (feet)	Sample status
0-2	Unsaturated zone
2-7	No sample collected
7-13	Non-detect
13-17	Detect
17-22	Exceed MCL

- Vertical aquifer sampling location, exceeds MCL for one or more constituents of interest
- Vertical aquifer sampling location, exceeds detection limit for one or more constituents of interest
- Vertical aquifer sampling location, all analytes less than detection limit
- Site boundary

Notes:
1) All sampling locations that exceed MCL also exceed one or more vapor intrusion level screening levels.
2) All constituent of interest results are in µg/L.
3) Results are presented for TCE / 1,1,1-TCA in µg/L for each sample result that exceeds detection limit.
4) Results that exceed the MCL are bolded.

LUSHER STREET GROUNDWATER CONTAMINATION SITE
ELKHART COUNTY, INDIANA

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FIGURE 9

VERTICAL AQUIFER SAMPLING GROUNDWATER RESULTS SUMMARY

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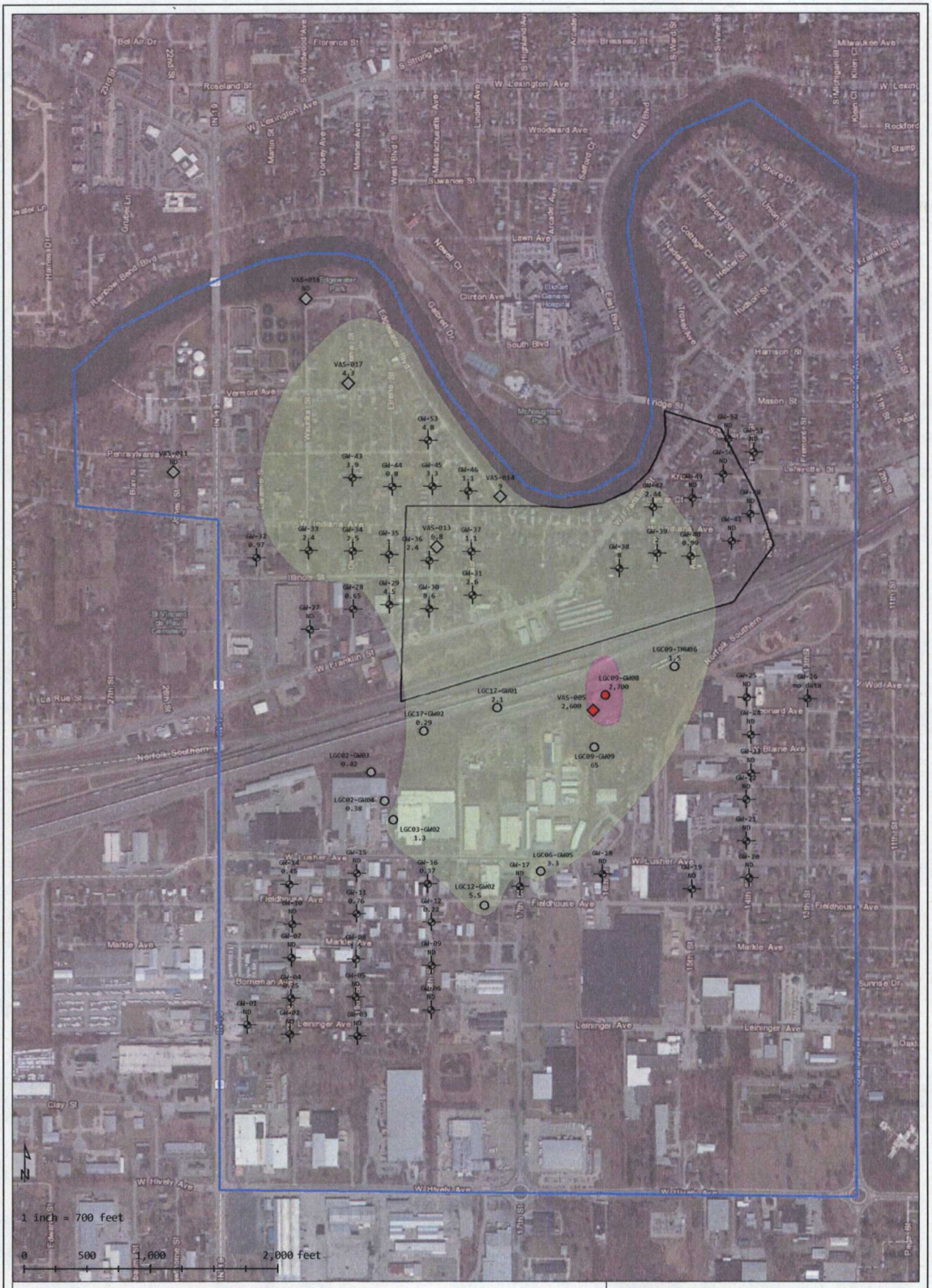
VAS exceedance
VAS non-exceedance
LGC exceedance
LGC non-exceedance
Groundwater sampling, step 1 vapor intrusion
200 µg/L plume
1 µg/L plume
TCE vapor intrusion area of concern
Site boundary
Notes:
Groundwater samples shown are collected from where groundwater was first encountered when sampling.
Results stated in micrograms per liter.
Sampling conducted in 2011.
LGC = Lusher Groundwater Contamination
VAS = Vertical Aquifer Sampling
Basemap source: Esri
1 inch = 700 feet
0
500
1,000
2,000 feet
N
LUSHER STREET GROUNDWATER CONTAMINATION SITE
ELKHART COUNTY, INDIANA
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FIGURE 10
1,1,1-TCA @ WATER TABLE
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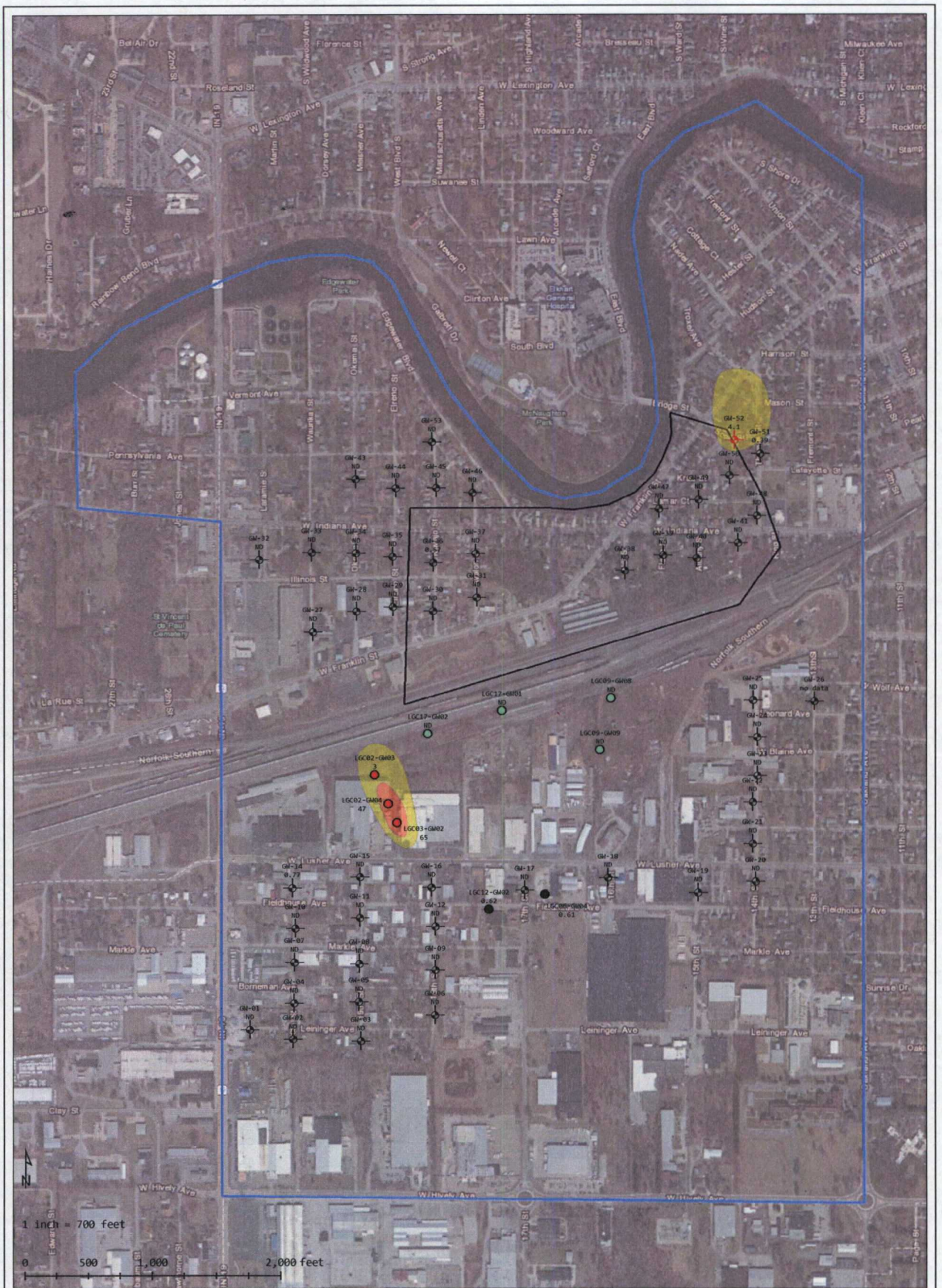
Groundwater sampling exceedance, step 1 vapor intrusion
Groundwater sampling detection, step 1 vapor intrusion
Groundwater sampling non-detection, step 1 vapor intrusion
Monitoring well exceedance
Monitoring well detection/ non-detection
5 µg/L plume
1 µg/L plume
TCE vapor intrusion area of concern
Site boundary
Notes:
Groundwater samples shown are collected from where groundwater was first encountered when sampling.
Results stated in micrograms per liter.
ND = not detected
Basemap source: Esri
1 inch = 700 feet
0
500
1,000
2,000 feet
N
LUSHER STREET GROUNDWATER CONTAMINATION SITE
ELKHART COUNTY, INDIANA
RECORD OF DECISION
FIGURE 11
PCE @ WATER TABLE
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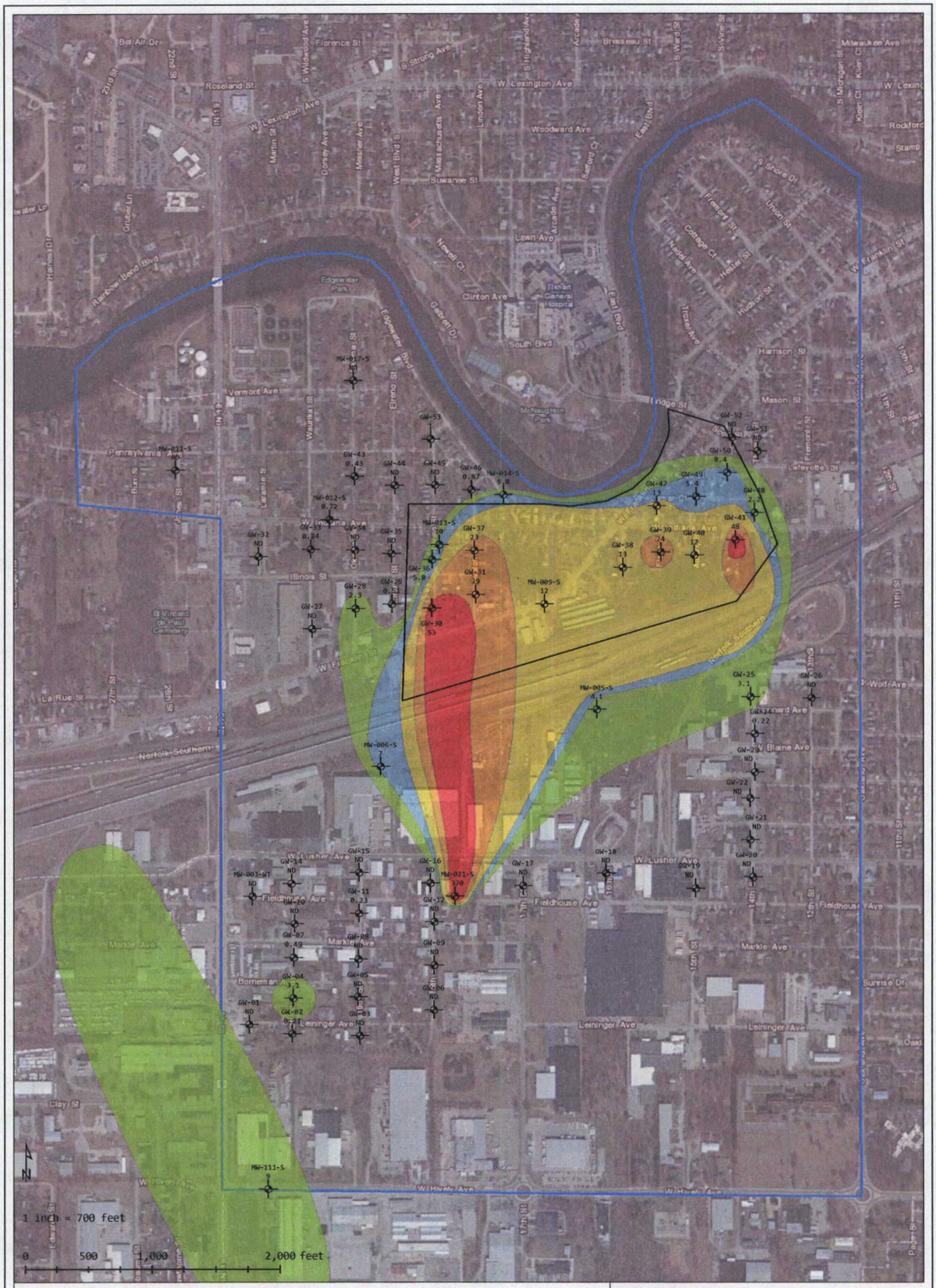

LUSHER STREET GROUNDWATER CONTAMINATION SITE
ELKHART COUNTY, INDIANA

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FIGURE 12

TCE @ WATER TABLE

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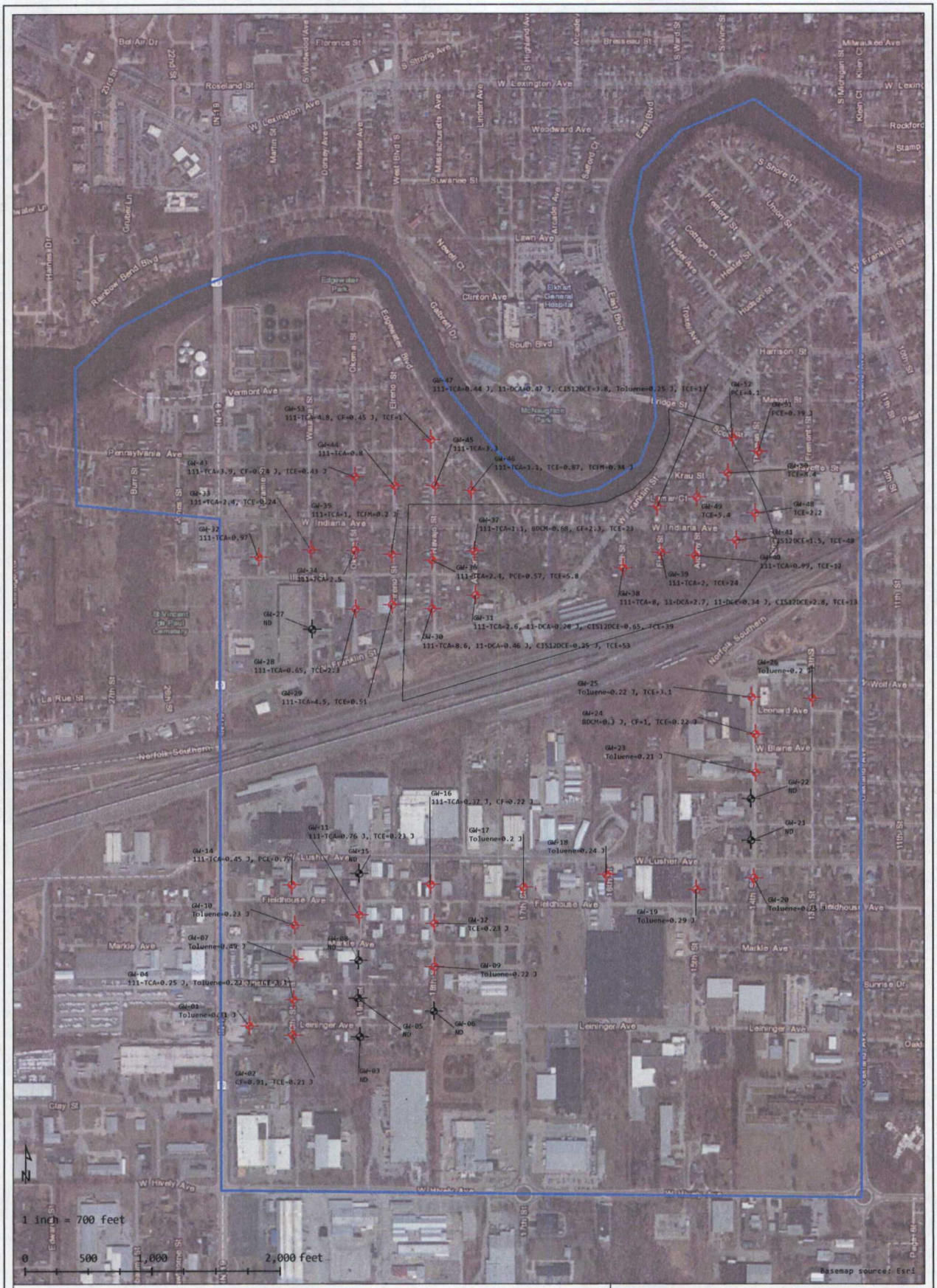
SulTRAC



Monitoring well with at least one VOC detection

Monitoring well with no VOC detections

TCE area of concern

Site boundary

Notes:
Groundwater samples shown are collected from where groundwater was first encountered when sampling.

Only detected results shown.

Results stated in micrograms per liter.

111-TCA = 1,1,1-Trichloroethane
11-DCA = 1,1-Dichloroethane
11-DCE = 1,1-Dichloroethene
BDCM = bromodichloromethane
CF = chloroform
CIS12DCE = cis-1,2-Dichloroethene
ND = not detected
TCE = trichloroethene
TCFM = trichlorofluoromethane
VOC = volatile organic compound

LUSHER STREET GROUNDWATER CONTAMINATION SITE
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FIGURE 13

VOC AT WATER TABLE SUMMARY

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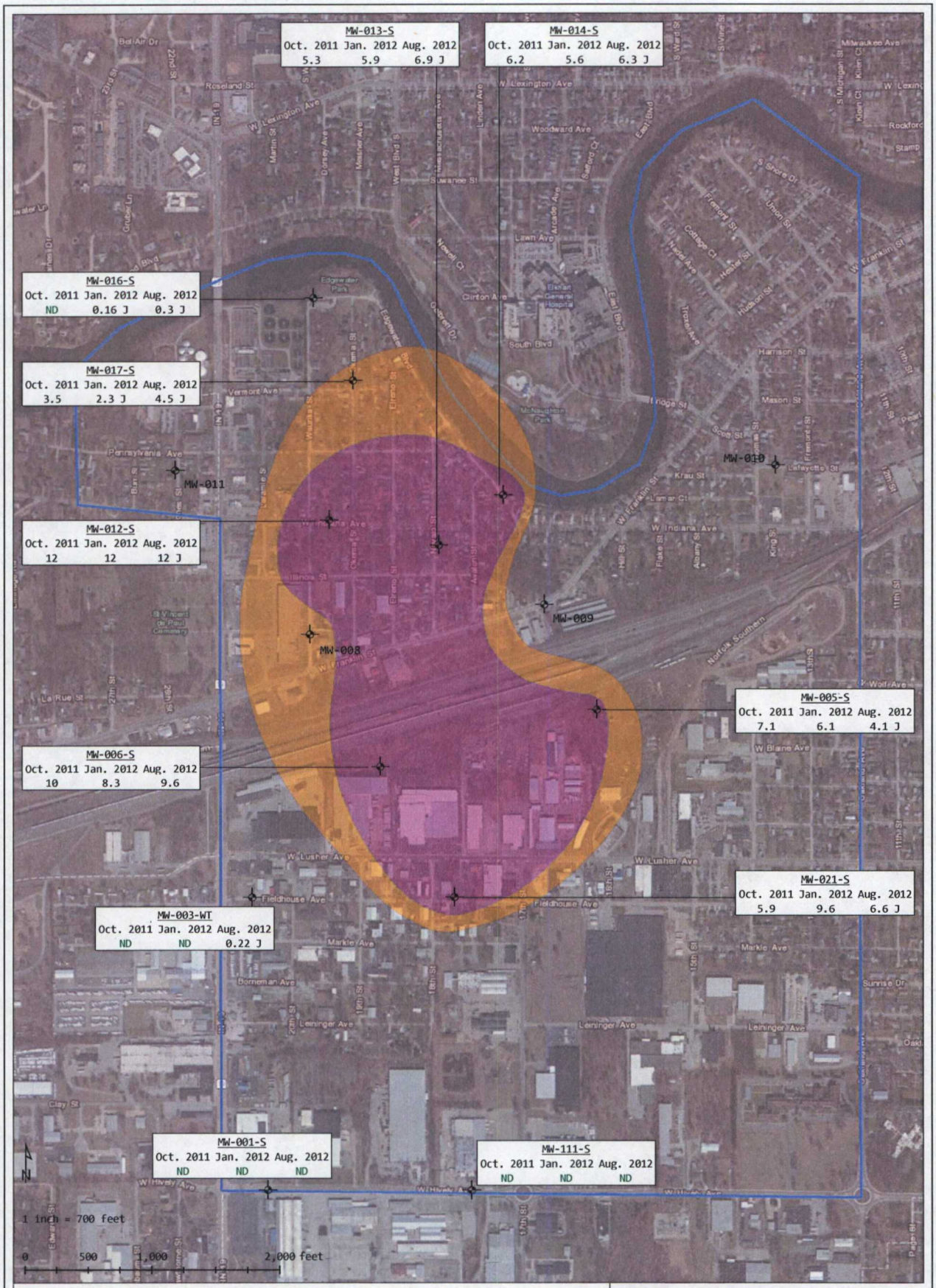
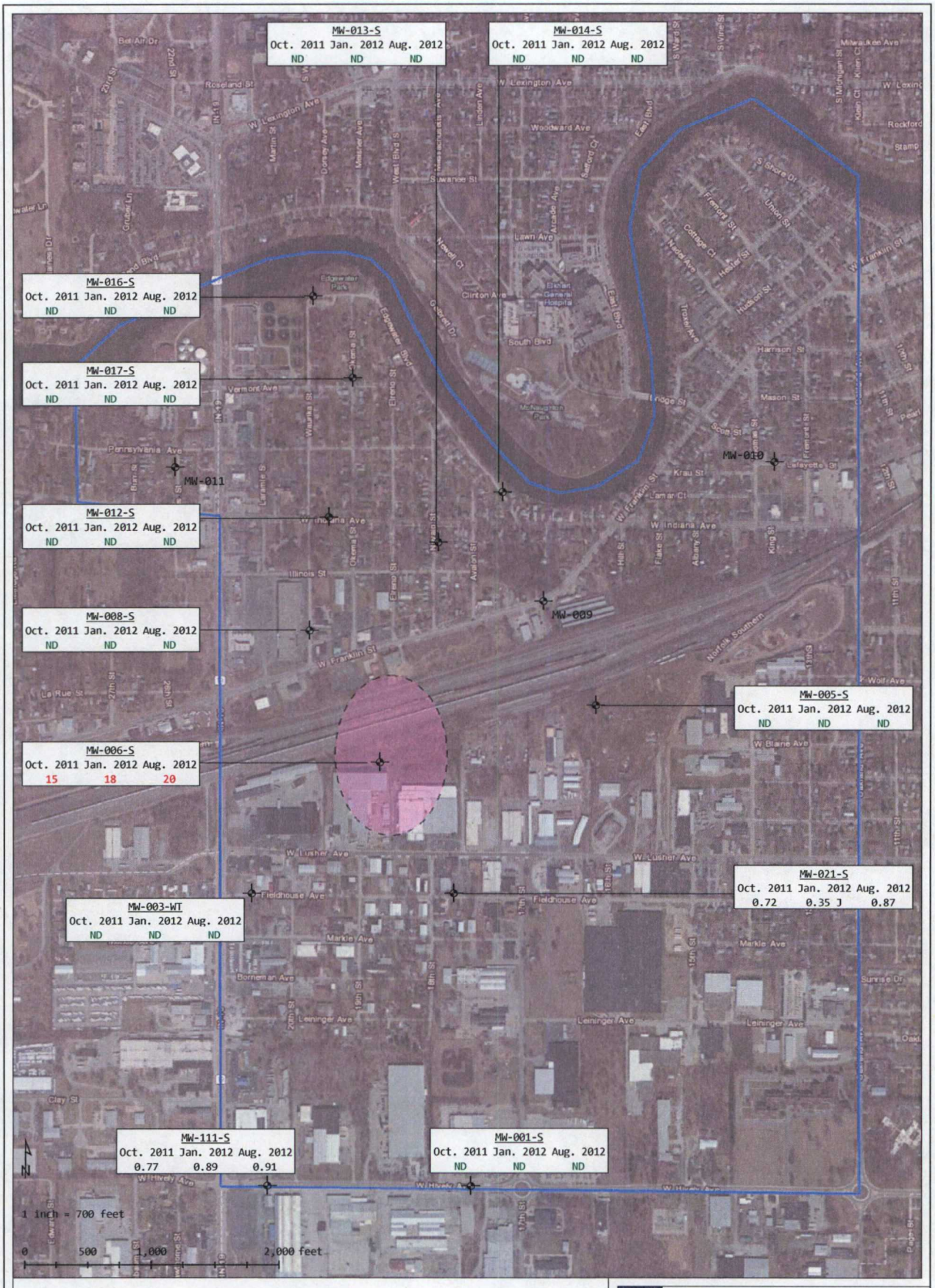

MW-013-S
Oct. 2011 Jan. 2012 Aug. 2012
5.3 5.9 6.9 J
MW-014-S
Oct. 2011 Jan. 2012 Aug. 2012
6.2 5.6 6.3 J
MW-016-S
Oct. 2011 Jan. 2012 Aug. 2012
ND 0.16 J 0.3 J
MW-017-S
Oct. 2011 Jan. 2012 Aug. 2012
3.5 2.3 J 4.5 J
MW-011
MW-012-S
Oct. 2011 Jan. 2012 Aug. 2012
12 12 12 J
MW-010
MW-009
MW-008
MW-005-S
Oct. 2011 Jan. 2012 Aug. 2012
7.1 6.1 4.1 J
MW-006-S
Oct. 2011 Jan. 2012 Aug. 2012
10 8.3 9.6
MW-021-S
Oct. 2011 Jan. 2012 Aug. 2012
5.9 9.6 6.6 J
MW-003-WT
Oct. 2011 Jan. 2012 Aug. 2012
ND ND 0.22 J
MW-001-S
Oct. 2011 Jan. 2012 Aug. 2012
ND ND ND
MW-111-S
Oct. 2011 Jan. 2012 Aug. 2012
ND ND ND
N
1 inch = 700 feet
0 500 1,000 2,000 feet
Monitoring well
TCA exceeds 5 µg/L
TCA exceeds 1 µg/L
Site boundary
Notes:
Data shown represents samples collected between 8 ft and 27 ft below ground surface.
Only detected results shown.
Results stated in micrograms per liter.
ND = not detected
Basemap source: Esri
LUSHER STREET GROUNDWATER CONTAMINATION SITE
ELKHART COUNTY, INDIANA
RECORD OF DECISION
FIGURE 14
SHALLOW TCA SUMMARY
EPA REGION 5 RAC 2 | REVISION 0 | JUNE 2014
SulTRAC



Monitoring well

5 µg/L plume

Site boundary

Notes:
Data shown represents samples collected between 8 ft and 27 ft below ground surface.
Only detected results shown.
Red font indicates an exceedance of MCL.
Results stated in micrograms per liter.
Yellow shading indicates an exceedance of Spring 2012 RSL.

ND = not detected

Basemap source: Esri

LUSHER STREET GROUNDWATER CONTAMINATION SITE
ELKHART COUNTY, INDIANA

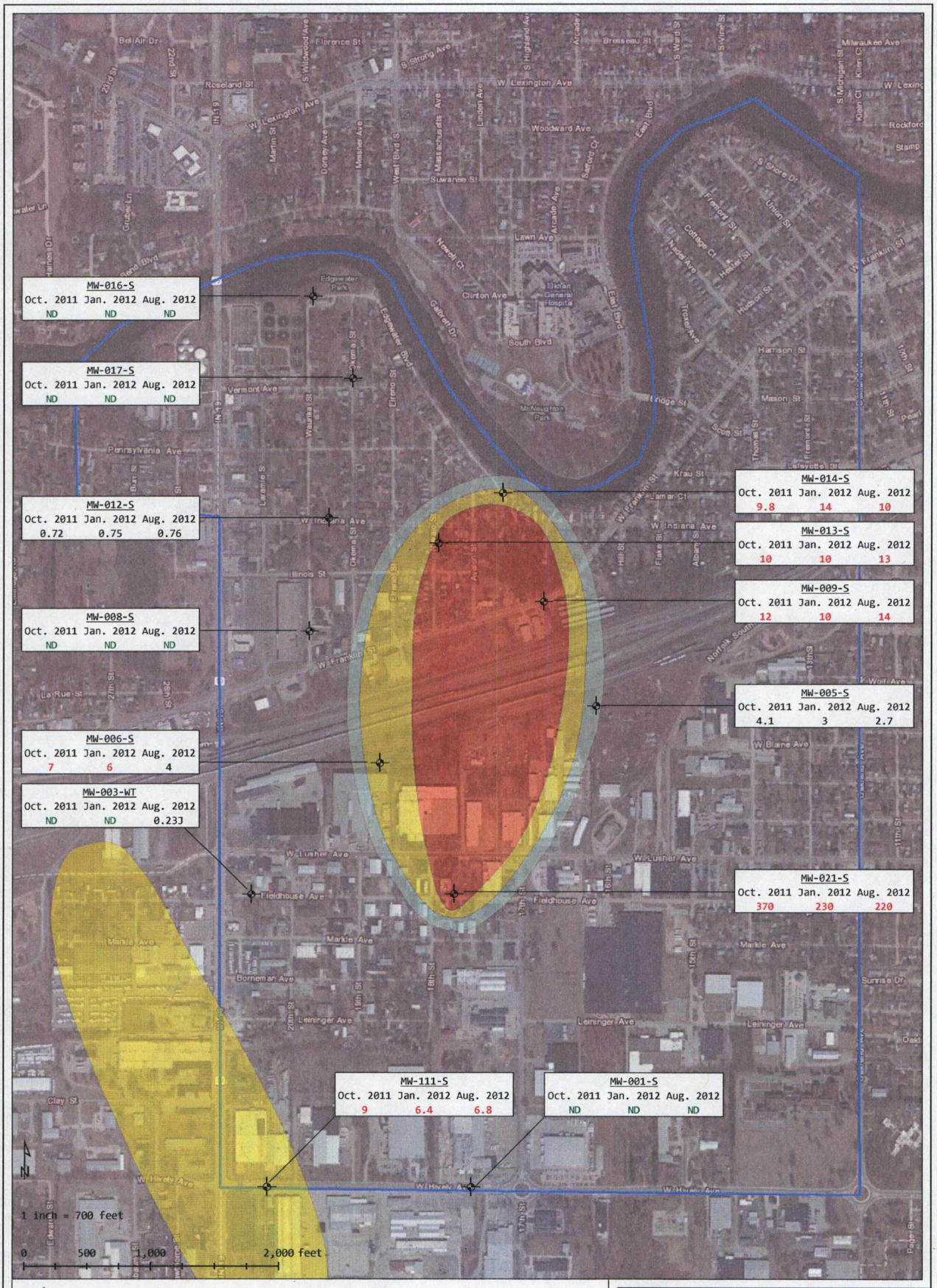
RECORD OF DECISION

FIGURE 15

SHALLOW PCE SUMMARY

EPA REGION 5 RAC 2 | REVISION 0 | JUNE 2014

SulTRAC



Monitoring well

10 µg/L plume

5 µg/L plume

1 µg/L plume

Site boundary

Notes:
Data shown represents samples collected between 8 ft and 27 ft below ground surface.
Only detected results shown.
Red font indicates an exceedance of MCL.
Results stated in micrograms per liter.
Yellow shading indicates an exceedance of Spring 2012 RSL.

ND = not detected

Basemap source: Esri

LUSHER STREET GROUNDWATER CONTAMINATION SITE
ELKHART COUNTY, INDIANA

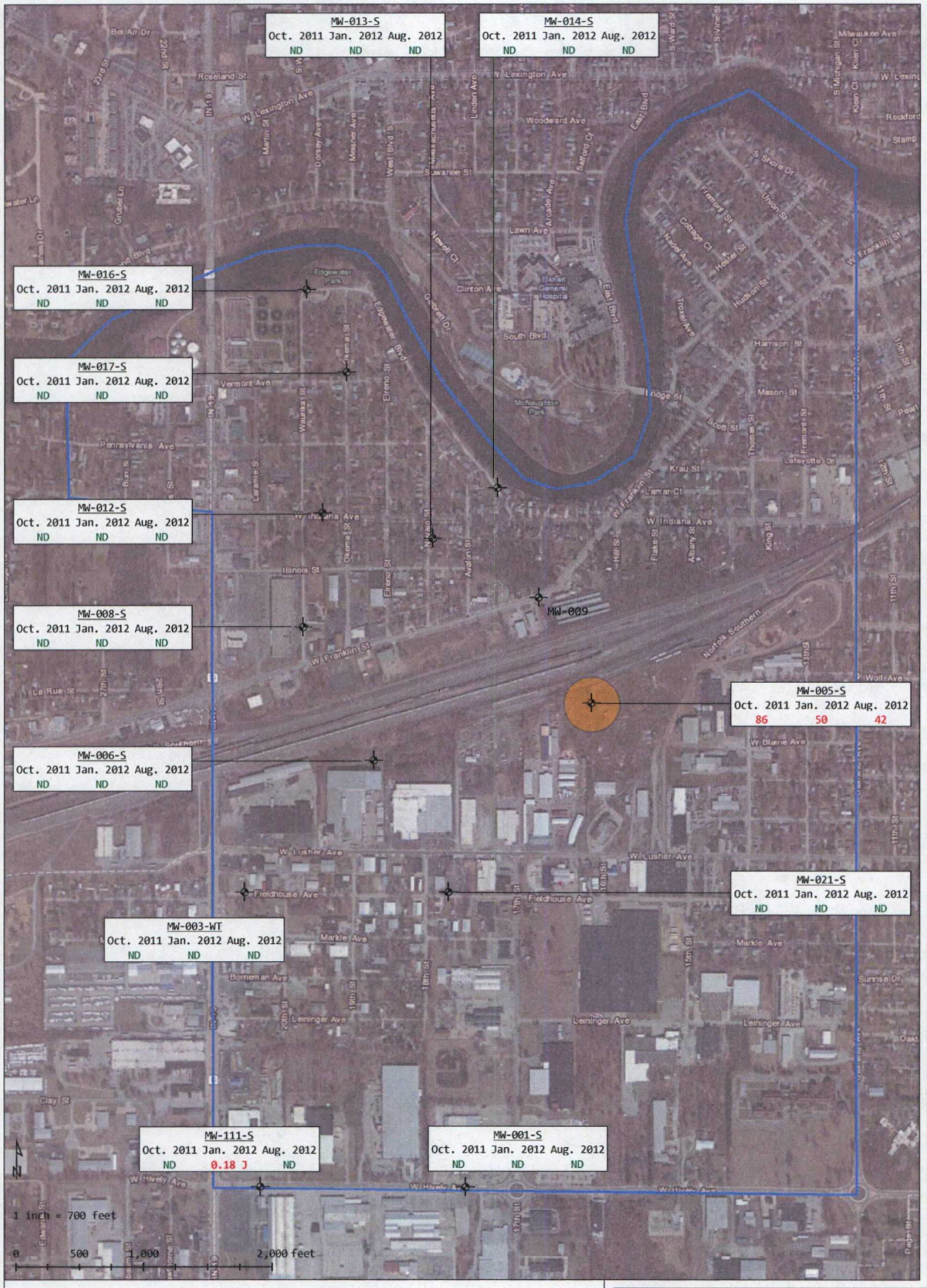
RECORD OF DECISION

FIGURE 16

SHALLOW TCE SUMMARY

EPA REGION 5 RAC 2 | REVISION 0 | JUNE 2014

SulTRAC



Notes:
Data shown represents samples collected between 8 ft and 27 ft below ground surface.
Only detected results shown.
Red font indicates an exceedance of MCL.
Results stated in micrograms per liter.
Yellow shading indicates an exceedance of Spring 2012 RSL.

ND = not detected

Basemap source: Esri

LUSHER STREET GROUNDWATER CONTAMINATION SITE
ELKHART COUNTY, INDIANA

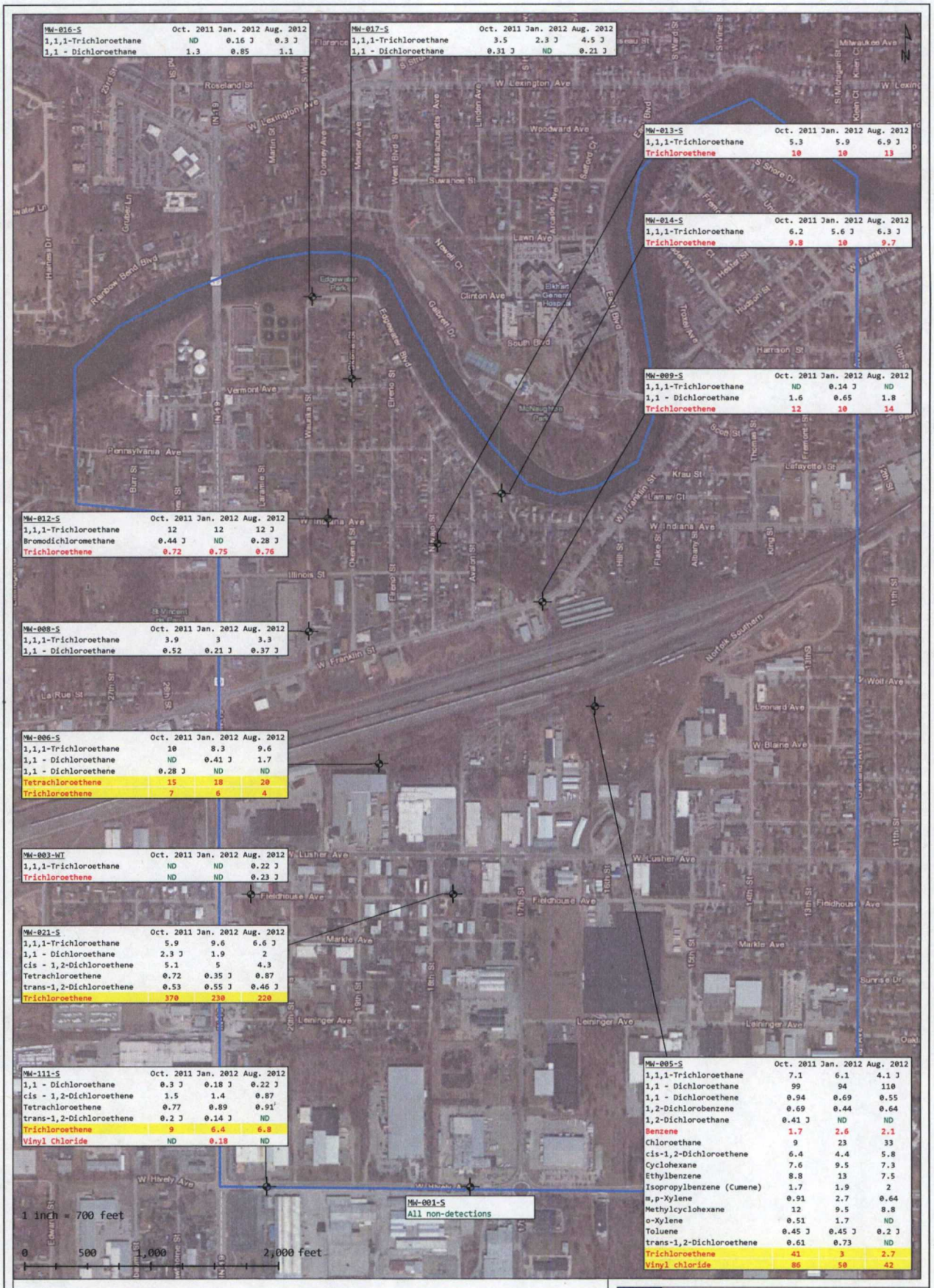
RECORD OF DECISION

FIGURE 17

SHALLOW VC SUMMARY

EPA REGION 5 RAC 2 | REVISION 0 | JUNE 2014

SulTRAC



Monitoring well

Site boundary

Notes:
Data shown represents samples collected between 8 ft and 27 ft below ground surface.
Only detected results shown.
Red font indicates an exceedance of MCL.
Results stated in micrograms per liter.
Yellow shading indicates an exceedance of Spring 2012 RSL.

ND = not detected

Basemap source: Esri

LUSHER STREET GROUNDWATER CONTAMINATION SITE
ELKHART COUNTY, INDIANA

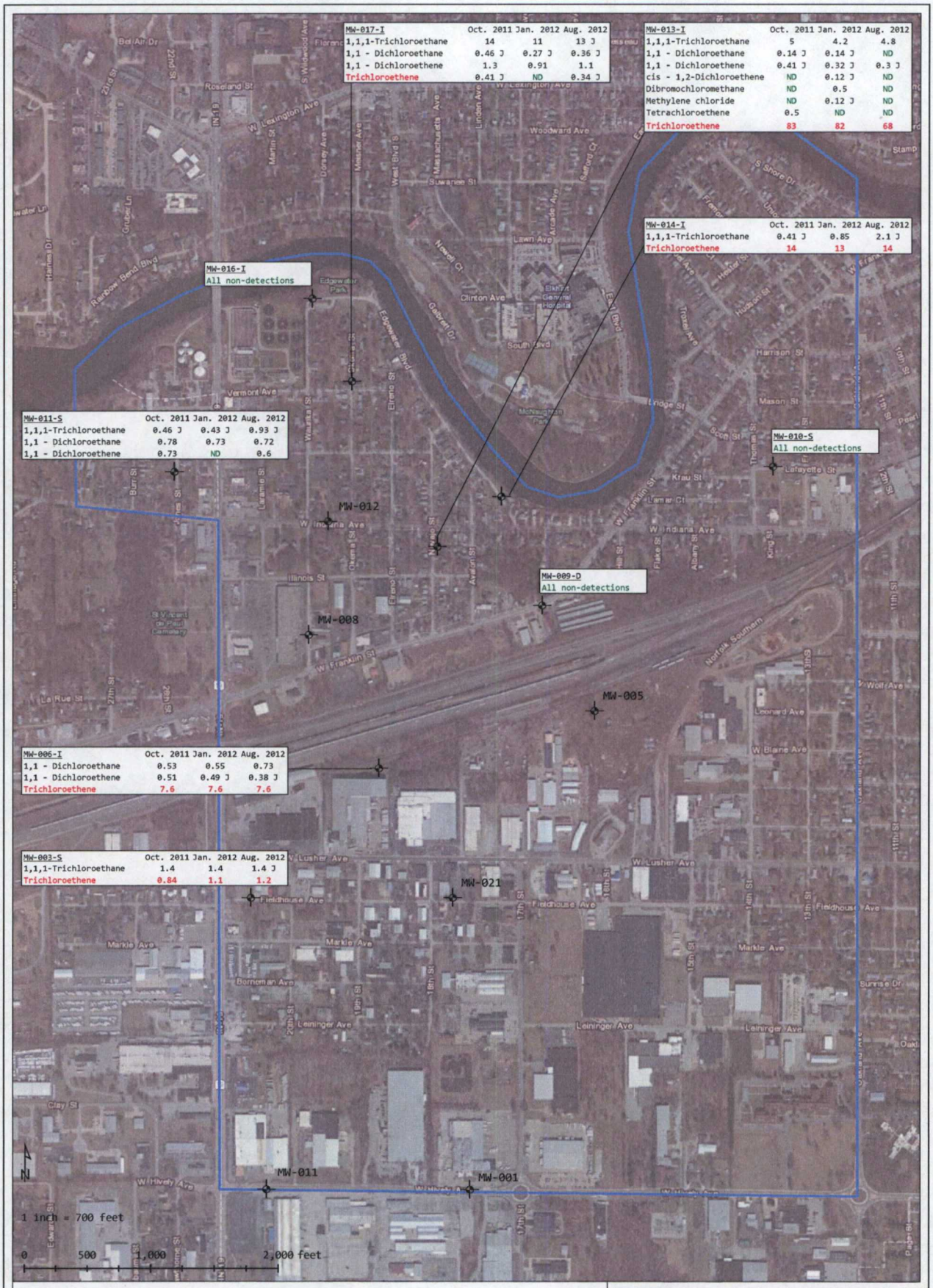
RECORD OF DECISION

FIGURE 18

MW VOCS SHALLOW SUMMARY

EPA REGION 5 RAC 2 | REVISION 0 | JUNE 2014

SulTRAC



Monitoring well

Site boundary

Notes:
Data is from samples collected between 35 and 87 feet below ground surface, except at MW-016 (18 to 28 ft bgs) and MW-017I (28 to 38 ft bgs).
Only detected results shown.
Red font indicates an exceedance of MCL.
Results stated in micrograms per liter.
Yellow shading indicates an exceedance of Spring 2012 RSL.

ND = not detected

Basemap source: Esri

LUSHER STREET GROUNDWATER CONTAMINATION SITE
ELKHART COUNTY, INDIANA

RECORD OF DECISION

FIGURE 19
MW VOCS INTERMEDIATE DEPTH SUMMARY

EPA REGION 5 RAC 2 | REVISION 0 | JUNE 2014

ST SulTRAC

Monitoring well

Site boundary

Notes:
Data is from samples collected over 100 feet below ground surface.
Only detected results shown.
Red font indicates an exceedance of MCL.
Results stated in micrograms per liter.
Yellow shading indicates an exceedance of Spring 2012 RSL.

ND = not detected

Basemap source: Esri

LUSHER STREET GROUNDWATER CONTAMINATION SITE
ELKHART COUNTY, INDIANA

RECORD OF DECISION

FIGURE 20

MW VOCS DEEP SUMMARY

EPA REGION 5 RAC 2 | REVISION 0 | JUNE 2014

SulTRAC

APPENDICES

Appendix A – Administrative Record Index

Appendix B – State Concurrence Letter

Appendix C – Responsiveness Summary

Appendix A
Administrative Record Index

U.S. ENVIRONMENTAL PROTECTION AGENCY
REMEDIAL ACTION

ADMINISTRATIVE RECORD
FOR THE
LUSHER STREET GROUND WATER CONTAMINATION SITE
ELKHART, ELKHART COUNTY, INDIANA

ORIGINAL
SEPTEMBER, 2014
SEMS ID: 914952

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	279352	No date	United States of America	Walerko Tool & Engineering Corp.	United States' Memorandum in Support of Motion for Summary Judgment on Liability - US v. Walerko Tool & Engineering Corp - Civil Action S91-00411M (HRS Reference #35)	18
2	279332	10/1/81	U.S. Geological Survey	Indiana Department of Environmental Management	Hydrologic & Chemical Evaluation of Ground Water Resources of Northwest Elkhart County, IN (HRS Reference #15)	150
3	279350	3/7/85	U.S. EPA	Gemeinhardt	Administrative Order: Gemeinhardt, V-W-85-C-003 (HRS Reference #33)	23
4	279343	1/1/87	Indiana Department of Natural Resources	Public	Water Resource Availability in St. Joseph River Basin, IN (Exerpt) (HRS Reference #26)	21
5	225739	12/21/87	Theisen, K., U.S. EPA	Constantelos, B., U.S. EPA	Action Memorandum re: Request for Removal Action at the Lusher Street Groundwater Contamination Site (HRS Reference #10)	5
6	225736	1/15/88	Weston	U.S. EPA	Groundwater Investigation Report (HRS Reference #11)	19
7	279342	1/20/88	Elkhart County Health Department	File	State Road 19 & Lusher Street Investigation (HRS Reference #25)	206
8	225738	6/9/88	Theisen, K., U.S. EPA	Constantelos, B., U.S. EPA	Action Memorandum re: Ceiling Increase Request for the Removal Action at the Lusher Street Site	6

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
9	279339	9/1/88	U.S. EPA	Public	Fact Sheet - Evaluating Groundwater Plumes under Hazard Ranking System (HRS Reference #22)	5
10	225737	3/6/89	Theisen, K., U.S. EPA	File	On-Scene Coordinator's (OSC) Report (HRS Reference #9)	18
11	279333	11/10/89	Groundwater Technology, Inc.	U.S. EPA	Subsurface Investigation for Conrail Railyard (HRS Reference #16)	420
12	279362	1/23/90	U.S. EPA	Gemeinhardt	Administrative Order by Consent - Gemeinhardt Docket No. V-W-85-C-003 (HRS Reference #45)	22
13	279356	1/23/91	Walerko, E.	File	Deposition of Edward Michael Walerko (Exerpt) - USA v. Consolidated Rail Corp, Civil Action S90-00056 (HRS Reference #39)	5
14	279357	12/5/91	Walerko Tool & Engineering Corp	File	Response to Plantiff's First Set of Interrogatories to Defendant Walerko Tool & Engineering Corp - Civil Case No. S91-00411M (HRS Reference #40)	11
15	279353	1/6/92	Walerko Tool & Engineering Corp	United States of America	Responses to Requests for Admissions from USA - Civil Action s91-00411M (HRS Reference #36)	6
16	279355	8/19/92	McDaniel, D.	File	Declaration of Doug McDaniel, Walerko Tool & Engineering Corp (HRS Reference #38)	3
17	279354	8/27/92	Landry, B.	File	Declaration of Bryan Landry, Walerko Tool & Engineering Corp (HRS Reference #37)	4
18	279358	9/11/92	Theisen, K., U.S. EPA	File	Declaration of Kenneth M. Theisen in Support of Motion for Summary Judgment - USA v. Walerko Tool & Engineering Corp - Civil Action No. S89-00348 (HRS Reference #41)	5
19	279347	11/1/92	U.S. EPA	File	Hazard Ranking System (HRS) Guidance Manual (Exerpt) (HRS Reference #30)	3

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
20	279338	11/22/93	Peterson, L., U.S. EPA	Traub, J., U.S. EPA	Memo re: Entry of US v. Walerko Tool & Engineering Corp Cost Recovery Consent Decree (Signed Consent Decree Attached) (HRS Reference #21)	24
21	279330	1/1/94	U.S. Geological Survey	File	7.5 Minute Series Topographical Map, Elkhart Quadrangle, IN, Revised 1994 (HRS Reference #13)	1
22	279331	1/1/94	U.S. Geological Survey	File	7.5 Minute Series Topographical Map, Osceola Quadrangle, IN, Revised 1994 (HRS Reference #14)	1
23	279336	1/1/94	U.S. Geological Survey	Indiana Department of Environmental Management	Hydrogeologic Atlas of Aquifers in Indiana, Water-Resources Investigations Report 92-4142 (HRS Reference #19)	13
24	279334	3/31/94	Ecology & Environment, Inc.	U.S. EPA	Remedial Investigation/Feasibility Study - Conrail Site, Elkhart, IN - Volume 1 (HRS Reference #17)	313
25	279335	3/31/94	Ecology & Environment, Inc.	U.S. EPA	Remedial Investigation/Feasibility Study - Conrail Site, Elkhart, IN - Volume 1 (HRS Reference #18)	245
26	279375	11/1/96	U.S. EPA	Public	Fact Sheet - Using Qualified Data to Document an Observed Release & Observed Contamination (HRS Reference #58)	18
27	279368	1/1/05	U.S. Census Bureau	Public	Fact Sheet - Elkhart County, Indiana - 2005 American Community Survey (HRS Reference #51)	2
28	279361	9/1/06	U.S. EPA	Public	Fact Sheet - Conrail Railyard (HRS Reference #44)	3
29	279326	9/12/06	Indiana Department of Environmental Management	File	Sample Field Sheets (HRS Reference #5)	17
30	279322	10/23/06	U.S. EPA	Public	Superfund Chemical Data Matrix (with Appendicies) (HRS Reference #2)	60

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
31	279348	10/25/06	Ostrodka, S., U.S. EPA	Indiana Department of Environmental Management	Review of Data Received for Review on 10/4/2006, CASE #35735, Mitkem Corp (HRS Reference #31)	78
32	259797	12/4/06	Theisen, K., U.S. EPA	Nachowicz, L., U.S. EPA	Action Memorandum re: Request for an Emergency Removal Action at the Lusher Street Site (Second Removal) (HRS Reference #12) ***(Portions of this document have been redacted)***	12
33	279321	12/4/06	U.S. EPA	Public	Hazard Ranking System (HRS), 40 CFR Part 200, Appendix A, 55 FR 51533 (HRS Reference #1)	138
34	279327	12/7/06	Indiana Department of Environmental Management	File	Sample Field Sheets (HRS Reference #6)	54
35	279340	12/12/06	DeLong, A., Indiana Department of Environmental Management	Cantwell, R., Indiana Department of Environmental Management	Memo re: Analytical Results for Sturgis Metals (HRS Reference #23)	8
36	279328	12/13/06	Indiana Department of Environmental Management	File	Sample Field Sheets (HRS Reference #7)	5
37	279349	1/22/07	Ostrodka, S., U.S. EPA	Indiana Department of Environmental Management	Review of Data Received for Review on 12/28/2006, Case #35998, KAP Technologies (HRS Reference #32)	321
38	279360	1/29/07	Theisen, K., U.S. EPA	File	Pollution Report (Polrep) #1, First & Final (HRS Reference #43)	2
39	279329	3/1/07	Indiana Department of Environmental Management	File	Telephone Conversation Logs (HRS Reference #8) ***(Portions of this document have been redacted)***	11
40	279366	3/20/07	Indiana Geological Survey	File	Map of Lusher Street Groundwater Contamination Site (HRS Reference #49)	1

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
41	279364	3/22/07	U.S. EPA	Public	Toxic Release Inventory, Flexible Foam Products (HRS Reference #47)	7
42	279337	4/9/07	Indiana Department of Environmental Management	File	Site Visit/Interviews Affidavit (HRS Reference #20)	20
43	279341	4/13/07	McDaniel, K., Indiana Department of Environmental Management	Jaworski, M., Indiana Department of Environmental Management	Email re: Contamination at 1619 Avalon (HRS Reference #24)	1
44	279346	4/19/07	Giesting, P., Indiana Department of Environmental Management	Jaworski, M., Indiana Department of Environmental Management	Memo re: Correlation of Sample Locations & IDNR Well Records (HRS Reference #29)	3
45	279344	4/20/07	Jaworski, M., Indiana Department of Environmental Management	File	Technical Memorandum re: Hazard Ranking System (HRS) Documentation Record (HRS Reference #27)	18
46	279323	5/1/07	Indiana Department of Environmental Management	U.S. EPA	Site Inspection Report for Lusher Street Groundwater Contamination Site (Volume 1) (HRS Reference #3)	162
47	279324	5/1/07	Indiana Department of Environmental Management	U.S. EPA	Site Inspection Report for Lusher Street Groundwater Contamination Site (Volume 2) (HRS Reference #3)	501
48	279351	5/1/07	U.S. EPA	Public	Superfund Site Information, Update on Lusher Street Groundwater Contamination (Reference #34)	2
49	279359	5/2/07	U.S. EPA	Public	Drinking Water Contaminants with List of Contaminants & their MCLS (HRS Reference #42)	12
50	279363	5/3/07	ThomasNet	Public	Company Profile of B-D Industries Inc (HRS Reference #46)	1

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
51	279365	5/3/07	Flexible Foam Products, Inc.	Public	Company History of Flexible Foam Products Inc (HRS Reference #48)	1
52	279369	5/4/07	Espich, M., Indiana Department of Environmental Management	Jaworski, M., Indiana Department of Environmental Management	Email re: Sturgis Sample Results (HRS Reference #52)	1
53	279367	5/7/07	U.S. EPA	Public	Toxic Release Inventory of Gaska Tape Inc (HRS Reference #50)	4
54	279370	6/27/07	Manta.com	Public	Company Profile of Gemeinhardt Co. Inc. (HRS Reference #53)	2
55	279371	6/28/07	U.S. EPA	Public	SOM01.1 Volatile Target Compound List & Corresponding CRQLS (HRS Reference #54)	3
56	279372	6/29/07	Jaworski, M., Indiana Department of Environmental Management	File	Affidavit of Mark Jaworski (HRS Reference #55)	1
57	279373	7/9/07	Esserman, S., Indiana Department of Environmental Management	Jaworski, M., Indiana Department of Environmental Management	Memo re: Installation of Point-of-Entry (POC) Granular Activated Carbon (GAC) Water Filter Systems (HRS Reference #56)	5
58	279374	7/9/07	Jaworski, M., Indiana Department of Environmental Management	File	General Affidavit - Telephone Conversation between Mark Jaworski & Gene Burger re: Source of Drinking Water (HRS Reference #57)	1
59	279325	7/11/07	Indiana Department of Environmental Management	File	Sample Field Sheet Affidavit (HRS Reference #4)	1
60	279376	7/16/07	Jaworski, M., Indiana Department of Environmental Management	File	General Affidavit - Five Sampling Events for Lusher Street Groundwater Contamination (HRS Reference #59)	1

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
61	279345	7/18/07	Indiana Department of Environmental Management	File	Ground Water Plume Boundary Map Defined by Chlorinated VOCs from Key Findings Lists, Events 3, 4, & 5 Including Potential Sources (HRS Reference #28)	1
62	279377	7/18/07	Indiana Geological Survey	File	Total Thickness of Clay in Indiana (HRS Reference #60)	2
63	279320	9/1/07	U.S. EPA	Public	Hazard Ranking System (HRS) Documentation Record	58
64	914891	4/1/09	SulTRAC	Krause, P., U.S. EPA	Community Involvement Plan	27
65	909782	3/16/10	Weston Solutions	U.S. EPA	Preliminary Investigation Report	56
66	475518	4/1/12	Mack, W., Lockheed Martin	U.S. EPA	Aerial Photographic Analysis of Lusher Street Groundwater Contamination Study Area	64
67	909141	9/1/13	SulTRAC	U.S. EPA	Final Remedial Investigation Report	4761
68	909139	9/1/13	SulTRAC	U.S. EPA	Final Focused Feasibility Study Report for Operable Unit 1	117
69	911172	4/1/14	U.S. EPA	Public	Proposed Plan	22
70	475513	4/29/14	Midwest Reporting	File	Transcript of Proposed Plan Public Meeting	57
71	914888	8/1/14	Palin, B., IDEM	Karl, R., U.S. EPA	Letter re: State of Indiana Concurrence with the Interim Record of Decision (ROD)	1

Appendix B
State Concurrence Letter

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
We Protect Hoosiers and Our Environment.
100 N. Senate Avenue • Indianapolis, IN 46204
(800) 451-6027 • (317) 232-8603 • www.idem.IN.gov

Michael R. Pence
Governor

Thomas W. Easterly
Commissioner

August 1, 2014

Richard Karl, Director
Superfund Division
U.S. EPA, Region V
Mail Code: SR-6J
77 West Jackson Boulevard
Chicago, IL 60604

Dear Mr. Karl:

Re: Draft Interim Record of Decision (ROD)
Lusher Street Superfund Site,
Elkhart, Indiana

The Indiana Department of Environmental Management (*IDEM*) has reviewed the U.S. Environmental Protection Agency's draft Interim Record of Decision (*ROD*) document for the Lusher Street Groundwater Contamination Superfund site in Elkhart, Indiana. IDEM is in full concurrence with the major components of the selected interim remedy outlined in the document, which include the following interim measures:

- Provision of alternative water supply or protection to approximately 70 residential properties in the groundwater cleanup area not currently connected to the city of Elkhart's municipal water supply.
- Installation of vapor intrusion (VI) mitigation systems, known as sub-slab depressurization systems (SSDs), in approximately 200 homes and buildings in a designated area of groundwater plume.

IDEM staff agree that the selected interim remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. IDEM staff have been working closely with Region V staff in the selection of an appropriate remedy and are satisfied with the selected alternative.

Please be assured that IDEM is committed to accomplish cleanup at all Indiana sites on the National Priorities List and intends to fulfill all obligations required by law to achieve that goal. We look forward to beginning remediation work on this project.

Sincerely,

Peggy Dorsey, Deputy AC for

Bruce H Palin
Assistant Commissioner
Office of Land Quality

BP:PK:tr
cc: Peggy Dorsey, IDEM
Bruce Oertel, IDEM
Rex Osborn, IDEM
Syed Quadri, EPA

Appendix C
Responsiveness Summary

Appendix C
Responsiveness Summary

Overview

The purpose of this Responsiveness Summary is to present and respond to public comments received by EPA on the proposed interim remedy for the Lusher Street Groundwater Contamination Site, Elkhart, Indiana. This Responsiveness Summary has been prepared in accordance with Section 117 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and July 1999 guidance document entitled *A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents* (EPA 540-R-98-031). The public comment period was held from April 21 to May 22, 2014. During this period, a public meeting was held on April 29, 2014 at the Calvary United Methodist Church, 2222 West Indiana Avenue, Elkhart, Indiana, 46516. Although no written comments were received from the citizens, verbal comments were received during the Public Meeting of April 29, 2014. EPA wishes to thank all members of the community who took the time to provide comments or otherwise participate in this public process.

Comment # 1: What is EPA's rationale for selecting Interim Vapor Intrusion Mitigation Alternative VI-2, Sub-slab (SSD) Depressurization System instead of the VI-3, SSD and Passive Barrier? Although, VI-3 will be more expensive than VI-2, under that alternative protection would be guaranteed.

Response to Comment # 1: Both Alternatives VI-2 and VI-3 would be effective remedies and reduce risks associated with Vapor Intrusion. It is true that Alternative VI-3 would be slightly more protective overall than Alternative VI-2 because, in addition to the SSD system, a passive barrier (sealant) would be added to further block VI. But Alternative VI-3 would also require more extensive Operation and Maintenance (O&M) when compared to Alternative VI-2. If the sealant is not maintained, the additional effectiveness would be reduced. O&M of the sealant component of Alternative VI-3 would involve returning to the basements and crawl spaces of the affected residences. In addition, the initial installation of the sealant is intrusive, because it requires basements to be cleared for installation, and presents small short term risks due to vapors from the sealant material itself.

VI-2 is preferred over VI-3, because the relatively minimal additional protectiveness added by Alternative VI-3 is outweighed by its greater intrusiveness on the residents and its significantly higher cost ($800 K for VI-2 versus $1.7 M for VI-3). Additionally, expected subsequent cleanup measures for the contaminated groundwater and source areas will address the sources of the VI contamination. Risk to VI exposures will then be reduced or eliminated permanently over time.

Comment # 2: Based on USEPA's past experience with the implementation of similar vapor intrusion remedies at other sites, would the implementation of the VI-2, Vapor Intrusion Remedy (such as vapor intrusion venting pipes on the roof) affect property values at the Lusher Site?

Response to Comment # 2: USEPA has limited experience concerning the impact of vapor intrusion remedies on property values. In general property values tend to be higher at homes where EPA is actively implementing or overseeing protective cleanup measures than at homes where contamination is known or suspected and unaddressed.